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About the cover

"Girl with Cat" was painted in 1856 by American-born, French-trained artist William Morris Hunt. The simple composition and warm but subdued color evident in this painting is characteristic of the mid-nineteenth century movements in French painting, as practiced by the artists of the Barbizon school. Hunt returned to the United States in 1855 and is credited with introducing to this country the work of Millet, Corot, and others from the Barbizon school.

Reproduction of this 42 × 33½ inch oil-on-canvas painting (00.504, Bequest of Edmund Dwight) was made possible through the Museum of Fine Arts, Boston.

Summary report of pilot projects for eradication of pseudorabies in swine

David Thawley, BVSc, PhD; George Beran, DVM, PhD; Alex Hogg, DVM, MS; Donald Gustafson, DVM, PhD; Ralph Vinson, DVM

Four times in the past decade, the Animal and Plant Health Inspection Service of the United States Department of Agriculture (USDA/APHIS) coordinated national serologic surveys of slaughtered swine to assess the prevalence of pseudorabies (PR) state by state. The findings for the total United States showed a steady increase from 0.56% in 1974 to 8.78% in 1984.[1] Of the 5 project states, Illinois and Iowa have a high prevalence of PR, and North Carolina, Pennsylvania, and Wisconsin have a relatively low prevalence of PR (Table 1).

In early 1983, the National Pork Producer's Council (NPPC) proposed to APHIS that pilot projects be conducted in several states, with joint financial sponsorship of NPPC and APHIS.[2] The project objectives, as set forth by the NPPC, were:

- Pilot projects should be designed to determine the practicality of area eradication of PR.
- Pilot projects should be designed to provide definite answers as to whether eradication of PR is achievable.
- Federal and state governments as well as producers must accept the results of the projects and modify approaches as necessary.
- A technical advisory committee should decide technical aspects of pilot project designs.

Five pilot projects were proposed: one in Illinois for Pike and Macoupin Counties, one in Marshall County, Iowa, and statewide eradication programs in North Carolina, Pennsylvania, and Wisconsin.

The Technical Advisory Committee was appointed by NPPC and USDA/APHIS to oversee the technical functioning of the pilot projects. Project plans were drawn up by each pilot state and reviewed by the Technical Advisory Committee. All projects were based on herd clean-up procedures of the Livestock Conservation Institute Guidelines.[3,4]

Table 1—Result of pseudorabies serologic surveys on slaughter swine (% positive by serum neutralization test)

Year	1974	1977-1978	1980-1981	1983-1984 Breeders	1983-1984 Market hogs
Total United States	0.56%	3.73%	8.39%	18.80%	8.18%
Pilot project states					
Illinois	1.14	3.29	6.40	17.05	6.75
Iowa	0.55	5.82	13.04	34.29	14.14
North Carolina	0	3.44	6.45	0	5.87
Pennsylvania	2.20	1.59	10.53	6.25	5.21
Wisconsin	0.52	1.41	2.96	4.76	1.74

The Illinois project used farm-to-farm sampling in a voluntary program, with quarantine of all infected herds and optional vaccination by permit only. Most herd clean ups were by test and removal or by depopulation.[a]

The Iowa project also used farm-to-farm sampling for the detection of PR-positive herds, with all swine farmers in the county voluntarily participating. Vaccination of female breeding stock was encouraged in infected herds and in herds considered to have a high risk of infection. Most herd clean ups were by offspring segregation and vaccination.[b]

North Carolina, in a statewide project in February 1984, used slaughter sampling with traceback and quarantine of all infected farms. Vaccination was by permit only. On Sept 30, 1986, the project was still in the early stages of herd and area clean up.[c]

Detection of PR-positive herds in the statewide Pennsylvania project was by slaughter sampling with traceback, together with quarantine of infected farms and shipment from infected herds to slaughter only under permit. Herd clean ups were accomplished principally by depopulation and were designed so as to reasonably expect clean up within 8 months.[d]

The authors constitute the Pseudorabies Technical Advisory Committee, appointed by the National Pork Producers Council and the USDA Animal and Plant Health Inspection Service. Dr. Thawley is from the College of Veterinary Medicine, University of Minnesota, St Paul, Minn; Dr. Beran is from the College of Veterinary Medicine, Iowa State University; Dr. Hogg is from the Department of Veterinary Science, University of Nebraska; Dr. Gustafson is from the College of Veterinary Medicine, Purdue University; and Dr. Vinson is in private practice in Oneida, Ill.

[a]Meat, Poultry and Livestock Division, Illinois Department of Agriculture, Springfield, Ill: Unpublished data, 1986.

[b]Division of Animal Industry, Iowa Department of Agriculture, Des Moines, Iowa: Unpublished data, 1986.

[c]North Carolina Department of Agriculture, Raleigh, NC: Unpublished data, 1986.

[d]Bureau of Animal Industry, Department of Agriculture, Harrisburg, Pa: Unpublished data, 1986.

The Wisconsin project was incorporated into the existing state eradication program. Detection of PR-positive herds was accomplished by testing breeding swine at slaughter, with traceback and quarantine of all known infected herds. Plans were designed to assure clean up within a 2-year period.[c]

Diagnostic tests and surveillance methods

The serum neutralization (SN) test, which measures virus neutralizing IgG, was the standard laboratory test for detecting the pseudorabies virus (PRV) infection in swine.[5] The SN test was used extensively in all the pilot projects.

The ELISA primarily measures IgG antibodies and detects infected swine more quickly, usually in about 7 days after infection.[6] The ELISA was utilized extensively in Illinois, North Carolina, and Pennsylvania as a screening test together with the SN test.

Two methods of detecting infected herds were used in the pilot projects: on-farm testing and slaughter sampling. Pennsylvania, Wisconsin, and North Carolina used slaughter sampling of culled breeding stock and traceback. These states tested sera from as many culled stock as could be identified and collected.

On-farm herd testing was used in the Iowa and Illinois projects, where area projects were less than statewide, and where herd prevalence of infection was 10 to 15%. Both projects used voluntary participation of area swine producers.

Clean up of infected herds

In each pilot project, a herd clean-up plan was developed for most herds identified as seropositive for PRV. Clean up of infected herds was voluntary except in Wisconsin and Pennsylvania. The plans developed by the Livestock Conservation Institute for the removal of PRV from herds of swine were the basis of these herd plans. All plans have been successfully applied in the pilot projects. Outlines of the clean-up plans are listed.

Offspring segregation without vaccination

- Select replacement gilts from progeny at weaning time, and raise in segregated facility. Test them at 5½ to 6 months old. If any are seropositive, remove promptly and retest in 30 to 60 days, or sell entire replacement group and start over.
- Isolate and test all replacement boars.
- Progressively depopulate, clean, and disinfect units, with at least a 30-day empty time for each unit.

Offspring segregation with controlled vaccination

Vaccination of breeding herd and progeny may be used to halt or prevent clinical epizootics.

- Select replacement gilts from progeny at weaning time.
- Raise in segregated facility.
- Test at 5½ to 6 months old. If any are seropositive, remove promptly and retest in 30 to 60 days, or sell entire replacement group and start over.
- May vaccinate replacement gilts at 1 or more of the following times: 1) At weaning if transmission is still probable, 2) at 5½ to 6 months old if seronegative, or 3) at 1 month before farrowing.
- Isolate and test all replacement boars.
- Rotate out all old breeding herd, using a progressive 30-day down time for each unit.

Test and removal of seropositive pigs (titer >1:4)

- Consider whether initial testing indicates absence of current spread of PRV, ie, by finding low rate of positive reactions or by finding generally low titers (titers ≤1:16).
- Test entire breeding herd and immediately remove all seropositve animals.
- Every 30 days, retest entire breeding herd and replacement gilts, to remove all seropositive animals, then continue testing until no more seropositive animals are found.

Depopulation/repopulation

- Depopulate entire farm of all hogs (sows usually sold after pigs are weaned and growers usually fed out to market weight).
- Clean hog units, feeders, and equipment thoroughly.
- Remove manure from pens and pump pits.
- Disinfect all units.
- Repopulate from seronegative herds.

The descriptive data and results of the pilot projects are given in Tables 2–4.

Results of initial case finding (detection of infected herds)

On-farm testing (Illinois and Iowa)—At the initiation of the projects, there were 13 quarantined herds in the Illinois project area and 11 in the Iowa project area. In the initial case-finding period, 19 additional infected herds were identified by serotest in the Illinois project area, and 18 were identified by serotest and 1 by virus isolation in the Iowa project area. Of the 62 infected herds initially identified in these 2 states, 37 (59%) were recognized only by serotest. Both states used on-farm sampling. The cost of blood testing (paid by the program) per herd identified as seropositive was $642.

Statistical herd sampling was designed to provide a 95% probability of detecting infection in a herd in which 10% of the animals are PRV-seropositive. The size of sample required to detect

[c]Animal Health Division, Wisconsin Department of Agriculture, Trade, and Consumer Protection, Madison, Wis: Unpublished data, 1986.

Table 2—Identification of infected herds in pilot projects

	No. of infected herds (by state)				
	Ill	Iowa	NC	Pa	Wis
Known infected herds at initiation	13	11	83	11	12
Additional herds identified as infected during first 18 months	19	21	0	20	2
Additional herds identified as infected after 18 months	6	13	0	80	35
Total infected herds in projects	38	45	83	111	49

Table 3—Results of herd clean-up progress during 3-year projects

	No. of herds in clean-up process (by state)				
	Ill	Iowa	NC	Pa	Wis
Herds identified as infected in first 18 months	32	32	...	31	14
Cleaned up	29 (91%)	31 (97%)	...	31 (100%)	13 (93%)
Herds identified as infected after 18 months	6	13	...	80	35
Cleaned up	0	5 (38%)	...	61 (76%)	22 (63%)

Table 4—Herd clean-up plans used in pilot projects

	No. of herds in a particular plan (by state)				
	Ill	Iowa	NC	Pa	Wis
Herd plans: (No. cleaned up/No. in plan)					
Depopulation/repopulation	1/1	9/10	—	75/91	16/16
Depopulated/not repopulated	7/12*	3/3	—	2/2	4/4
Test and removal of seropositive swine	17/17	4/4	—	15/18	11/11
Offspring segregation	4/4	20/28	—	—	4/4
Not yet implementing plans	4	3	—	—	14

*Only 7 of the 12 herds had completed depopulation at the completion of the project.

infected animals with this probability varied with the size of the herd to be sampled. For herds of <100 sows, a sample of 25 should be taken; for herds of 100 to 200, sample 27; for herds of 201 to 500, sample 28; and for herds >500, sample 29. It is important in statistical sampling that each group of segregated swine on the same farm be considered as separate herds.

Overall, in the Illinois project area, 93% of all herds were enrolled, with 19.3% of herds and 17.2% of all swine tested being seropositive. In Iowa, the corresponding figures were 99% herd participation, with 14.6% of herds and 21.1% of all swine tested being seropositive. In infected herds in Iowa, an average of 57.5% of breeding stock were seropositive.

In Illinois, 166 farms, 32 of them infected, were initially enrolled in the project. In Iowa, 213 farms, 30 of them infected, were initially enrolled. Clean-up plans were developed for each infected herd, and monitoring tests were scheduled for herds initially identified as clean.

Slaughter sampling (North Carolina, Pennsylvania, Wisconsin)—At the initiation of the projects, there were 83 PR-quarantined herds in North Carolina, 11 in Pennsylvania, and 12 in Wisconsin. Slaughter sampling was used throughout the project periods in these 3 states, with additional testing of breeding stock that passed through markets in Wisconsin. A total of 287,803 swine were tested in the 3 states. In North Carolina, 7.3% of 56,202 swine were seropositive. Only 1.2% of 184,786 swine from Pennsylvania and 1.2% of 46,615 swine from Wisconsin were seropositive.

Excluding 481 seropositive swine originating out of state, successful traceback was accomplished on 58.3% of the seropositive swine in North Carolina, 77.2% in Pennsylvania, and 95.0% in Wisconsin. Traceback to herds found to be clean by on-farm testing was a problem in all 3 states, with 10.4% of seropositive swine in these 3 states being traced back to herds in which seropositive swine could not be found. Traceback to herds known to be infected also increased the cost and labor for finding infected herds (33.7% of seropositve swine in North Carolina and 58.5% of seropositive swine in Wisconsin were traced back to known infected herds).

During the project periods, slaughter sampling identified 29 infected herds in North Carolina, 27 in Pennsylvania, and 11 in Wisconsin. Thus, overall in the 3 states, 67 infected herds were identified on the basis of testing of sera collected at slaughter and markets. This represents the finding of 1 infected herd for every 4,296 serum samples collected and tested.

By slaughter sampling, an average of approximately 2 sows/herd were sampled annually. (This does not represent adequate herd sampling, as this level of sampling will detect only about 50% of herds with 40% seroprevalence for PRV).[7] By slaughter sampling, the costs of blood testing (collection and analysis) to detect each PRV-positive herd was $3,000.

Results of herd clean up

Swine Farms with Sow Herds

Depopulation/repopulation—In total, 119 herds participated in a program of depopulation followed by repopulation. In Wisconsin, 16 of 16 herd owners successfully removed PRV from their herds by this practice. Figures for Illinois, Iowa, and Pennsylvania were 1 of 1, 9 of 10, and 75 of 91, respectively. Herds that had not fully cleaned up by Sept 30, 1986, represented recent infections in herds that had not fully completed the depopulation/repopulation process. One Iowa herd owner had successfully completed depopulation/repopulation and had established a PR-controlled vaccinated herd, but the herd became reinfected 22 months later. Epidemiologic evidence suggested this infection originated from area spread. Clean-up time (time from the beginning of depopulation to completed repopulation and recertification) varied considerably among herds. Where an immediate depopulation was used, clean-up time was 2 to 3 months. However, when a more phased type of depopulation was used, clean-up time ranged from 5 to 28 months.

Much of this variability was attributed to practices dictated by the producer. In general, phased-type depopulation/repopulation took a minimum of 6 to 8 months. In total, all herd owners who completed depopulation/repopulation were able to remove PRV from their premises.

Depopulation without repopulation—Depopulation without repopulation represents the process of herd depopulation without the short-term objective of repopulating the herd. During the pilot project period, 20 herd owners depopulated without repopulating. Reasons for undertaking this action were varied. In many cases, PR in the herd may have been only a secondary reason for the depopulation. Time to depopulate ranged from 7 to 29 months (average, 17 months). In many herds, the depopulation was prolonged, as the farms often functioned as feeder/finisher operations for an indefinite period before finally selling all swine.

Test and removal—Fifty herd owners used a test-and-removal procedure. In 47 (96%) of these herds, recertification was complete by Sept 30, 1986. In all these herds, additional seropositive swine were not found after the first complete herd test and removal. The initial PRV seroprevalence in herds in which test and removal were used ranged from 0.4 to 25%. State averages (initial seroprevalence) were: Illinois, 17% (17 herds); Iowa, 0.4% (4 herds); Pennsylvania, 3% (18 herds); and Wisconsin, 25% (11 herds). Full clean-up time (time from quarantine to recertification) averaged 4 to 5 months. This time also varied by state: Illinois, 3 months; Iowa, 7 months; Pennsylvania, 6 months; and Wisconsin, 6 months. Much of this variability was attributable to the scheduling of blood testing. In summary, test and removal was successful in removing PRV from all herds in which it was used for 2 complete herd tests. On Sept 30, 1986, 3 herds in Pennsylvania had not completed the testing regimen for recertification.

Offspring segregation—Thirty-six herd owners undertook an offspring segregation procedure. Thirty (83%) successfully removed PRV from their herds. Of those herds that were in a clean-up program for at least 18 months, all but 1 (in Iowa) was successfully cleaned up. In the single herd in Iowa that remained infected, the owner failed to follow the herd plan and mixed infected gilts with segregated offspring. As of Sept 30, 1986, 5 other herds in Iowa remained in the active phases of offspring segregation. Each of these herds had been newly identified as infected within the past 18 months.

Average herd size of herds attempting offspring segregation was approximately 100 sows, and average clean-up time (quarantine to recertification) was 16 months (range, 4 to 31 months).

Feeder Pig Finishing Farms Only

The projects in Iowa and Pennsylvania studied the effectiveness of various clean-up procedures on feeder pig feedlots. In Iowa, 2 feedlots (mean, 300 pigs) were depopulated without repopulating. In another 2 herds (mean, 850 pigs), PRV was successfully removed by depopulation/repopulation. In Pennsylvania, 26 herds (mean population, 470; range, 8 to 2,400 pigs) were successfully cleared of PRV infection by depopulation/repopulation. In 6 Pennsylvania feedlots (mean, 1,317 pigs; range, 160 to 3,000 pigs), PRV was successfully removed by identifying and segregating seropositive lots until slaughter.

Summary of herd clean up

A total of 253 infected herds were identified by the pilot projects. In the project states, of the 119 infected herds involved in a clean-up program at least 18 months before Sept 30, 1986, 116 (97.5%) had been recertified by that date. In only 3 herds in Illinois and 1 in Iowa was the owner unable to remove all seropositive swine within this period.

During the project period, additional herds were identified as infected. Many of these were identified in the latter months of these project periods. One hundred thirty-four of the herds were in this category. Many of these originated from new foci of infection in Pennsylvania (80 herds) and in Wisconsin (35 herds). In many of these herds, there was insufficient time to complete clean up before Sept 30, 1986.

Herd owners who successfully removed PRV spent from 1 to 31 months (mean, approximately 12 months) in the clean-up process. This represented the time from initial quarantine or identification of the infected herd to the time the herd was certified as PRV-free. As the projects continued, clean-up times became shorter. This was explained by the new knowledge obtained during the early stages of the projects, which permitted more efficient herd plans to be instituted. For example, in Iowa, over the 3-year project period, the mean clean-up time was reduced from 16.6 months to 8.6 months.

In all pilot project states, the mean number of sows in infected herds was 117, which compares with mean sow herd size in the United States of approximately 20.[f] In the Iowa project area, the mean number of sows in infected herds was 107. The mean number of sows in PRV-negative herds was 82.

Each participating herd in the Illinois and Iowa projects was classified as PRV-free or as infected on the basis of results of the initial serotests. Pseudorabies was detected during subsequent monitoring tests in 4 Illinois and 13 Iowa herds that were initially classified as PRV-free.

The sources of new herd infections within the Iowa and Illinois project areas were investigated. Of 14 new infections, 9 were attributed to producer errors such as movement of infected swine, and 5 were attributed to area spread from clinical epi-

[f]National Pork Producer's Assoc, Des Moines, Iowa.

zootics on farms outside project areas to neighboring farms within project areas. The source of infection in 3 herds was unknown.

Conclusions

Pseudorabies area control is feasible by applying currently available methods that are acceptable to pork producers and to the program coordinators.

- In the pilot project states, 97.5% of the 116 herds identified as infected during the first 18 months of the program were cleaned up. Considering the large number of herds in the category, we conclude that the removal of PRV from individual herds is feasible.
- Pseudorabies control/eradication programs are most effective if applied on an area basis. All infected herds in the control area should be identified, and herd clean-up plans should be coordinated simultaneously.
- The development of individual herd plans to fit the epidemiologic and managerial characteristics of each farm is essential to effective herd clean up.
- All methods for herd clean up listed in the new Livestock Conservation Institute guidelines were effectively used in the pilot projects.
- Movement of swine into and within control areas must be regulated to prevent spread of PRV to uninfected herds. This is true for both breeding stock and feeder pigs.
- Statistical sampling of herds based on 95% probability of detecting infection in herds, in which at least 10% of breeding stock are seropositive, proved successful in identifying infected herds in the Iowa and Illinois projects.
- Surveillance by use of on-farm testing is recommended in areas of high prevalence of PR.
- Serotests of breeding stock at slaughter was found to be inefficient. Major difficulties existed in the traceback of tested swine to their herds of origin and in falsely tracing seropositive swine to herds found to be PRV-free by further on-farm testing.
- The test and removal procedure was used effectively in 47 herds in which it was fully implemented. It was lowest in cost to the producer and least disruptive to management in herds in which a low percentage of breeding stock was seropositive and in which there was no evidence of current virus spread.
- Offspring segregation that permits retention of blood lines was successfully used in 97% of 31 herds. Effective isolation facilities are needed.
- Depopulation/repopulation was successful in 102 breeding herds in which it was fully implemented, but it was costly to most farmers. This method appears to have greatest application in areas of very low prevalence (ie, to remove infection from a herd in an otherwise PRV-free county or state), in herds with other production problems, or as a method of last resort.
- Twenty-eight feeder pig finishing farms (Pennsylvania and Iowa) were successfully cleared of PRV infection by depopulation/repopulation. In large feedlots, clean up may be achieved by a phased-type depopulation and cleaning and disinfection of separate finishing units as hogs are moved to slaughter.
- The provision of vaccine by government stimulated participation in the Iowa project. The use of vaccination was compatible with the offspring segregation plan of herd clean up. Vaccine use should be regulated by state authority.
- The SN test and ELISA are the basic serodiagnostic tests currently available. The use of new sensitive and rapid tests that may be performed on site will have use in both the finding of infected herds and in the monitoring of clean up.
- Widespread herd owner cooperation is essential to the success of the control/eradication of PR on an area-wide basis.

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Economic Note

Employment, starting salaries, and educational indebtedness of 1987 graduates of US veterinary medical colleges

In cooperation with US colleges of veterinary medicine, the AVMA conducted its annual survey of the graduating classes of veterinarians in spring 1987. The primary purpose of the survey was to secure data on veterinary graduates' employment, salaries, and educational indebtedness. Of the 2,226 US graduates, 1,288 responded to the survey, a response rate of 58%.

Employment and income

At the time of the survey, 87% of the responding graduates had received at least one employment offer. This compares with 78% in 1986. The increase in the percentage of graduates receiving offers likely is attributable to the fact that the 1987 survey was conducted approximately 1 month later in the spring than in 1986. The median number of offers received was 2/graduate. At the time of the survey, 74% of the graduates had accepted positions for employment.

Regarding the graduates who had accepted employment, 80% had accepted positions as employees in private practice (Tables 1 and 2). Mean starting salaries are reported for 790 graduates who indicated annual starting salaries for full-time employment. For graduates taking positions as private practice employees, the mean starting salary was $22,152. This represents a 4.5% increase over the 1986 mean starting salary of $21,205 for private practice employees.[1]

Specifically, 39.1% of graduates entered small animal exclusive practice at a mean annual salary of $22,688, up 4.9% from 1986; 11.9% entered small animal predominant practice at a mean annual salary of $21,634, up 2.2% from 1986. Also, 13.8% entered mixed animal practice at a mean annual salary of $21,039, up 2.7%. Only 3.5% of graduates entered equine practice, and the mean starting salary was $21,907, up 3.7%. In the livestock sector, 1.8 and 9.7% of graduates entered large animal exclusive and large animal predominant practice, respectively. In large animal exclusive and large animal predominant practice, mean starting salaries were $23,557, up 7.6%, and $20,731, up 6.4%, respectively. An additional 3.6% of the respondents

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Table 1—Types of employment and starting incomes of a large sample of 1987 US veterinary medical college graduates

	Percentage of graduates	Mean starting salary (No.)	Mean additional compensation expected in 1st year (No.)
Large animal exclusive	1.8	$23,557 (14)	$2,514 (7)
Large animal predominant	9.7	22,061 (80)	2,845 (48)
Mixed animal	13.8	21,039 (112)	2,503 (77)
Small animal predominant	11.9	21,634 (94)	3,029 (60)
Small animal exclusive	39.1	22,688 (314)	2,680 (177)
Equine predominant	3.5	21,907 (29)	5,192 (14)
University	1.2	23,560 (10)	... ...
Federal government	0.4	28,333 (3)*	... ...
Military service	1.4	30,267 (12)†	... ...
State/local government	0.1	20,000 (1)	... ...
Industry/commercial	0.2	26,768 (2)	... ...
Advanced study	12.8	15,272 (95)	3,420 (20)
Self-employed	3.6	30,125 (20)	... ...
Other	0.5	16,125 (4)	... ...
	100 (834)	$21,693 (790)‡	$2,839 (403)

*Starting salary for federal government employment of veterinarians with no experience, no advanced degree other than the DVM, and not in the top 25% of their class was $22,458 (GS 9, step 1). †Starting salary for military employment for veterinarians who are single, with no prior military service, including base pay, subsistence and quarters allowance, and veterinary special pay was $26,941. ‡Of the 834 graduates reporting employment, 790 graduates reported their annual starting salary for full-time employment.

Table 2—1987 starting salaries of 790 US veterinary medical college graduates, by type of employment

Starting salaries ($)	LAE	LAP	MA	SAP	SAE	EP	U	FG	MS	SLG	IC	AS	SE	Other	Total
11,000 or less	...	1	1	...	1	...	...	...	...	...	...	2	...	1	6
11,001 to 13,000	1	...	...	...	1	...	...	...	...	...	...	8	...	...	10
13,001 to 15,000	...	...	2	2	4	3	2	...	...	...	...	54	...	...	67
15,001 to 17,000	...	...	2	2	...	1	2	...	...	...	...	19	...	...	26
17,001 to 19,000	...	5	17	16	21	5	...	...	...	...	...	7	1	1	73
19,001 to 21,000	5	17	37	27	74	3	2	...	1	1	...	1	3	2	173
21,001 to 23,000	1	33	30	23	88	6	...	1	...	...	...	1	1	...	184
23,001 to 25,000	3	22	18	16	85	7	1	...	...	...	...	2	8	...	162
25,001 to 27,000	2	...	4	4	22	2	1	1	2	...	1	1	2	...	42
27,001 to 29,000	...	1	...	...	10	...	...	...	2	...	1	...	...	...	14
29,001 to 31,000	1	1	1	4	4	1	...	...	4	...	...	...	...	...	16
31,001 to 33,000	...	...	...	...	1	1	1	...	...	...	...	...	...	...	3
More than 33,000	1	...	...	...	3	...	1	1	3	...	...	...	5	...	14

LAE = Large animal exclusive; LAP = Large animal predominant; MA = Mixed animal; SAP = Small animal predominant; SAE = Small animal exclusive; EP = Equine predominant; U = University; FG = Federal government; MS = Military service; SLG = State/local government; IC = Industrial/commercial; AS = Advanced study; SE = Self-employed.

reported they would be self-employed in private practice, with an expected mean salary of $30,125.

As in 1986, less than 2% of the graduates accepted positions with the federal government and the military service. Mean starting salaries were $28,333 and $30,287, respectively. One respondent entering state/local government reported a salary of $20,000. For 2 graduates entering the industry sector, the mean salary was $26,768.

In the academic sector, 1.2% took university positions (research or teaching) at a mean salary of $23,580, and 12.8% would begin advanced study (graduate degree, internship, or residency program) at a mean salary of $15,272.

All graduates were asked if they would receive compensation in addition to their salary in their first year of employment. One half of the graduates who reported starting salaries indicated that they would receive additional compensation within the first year. Most likely, the additional pay represents a percentage of gross income, a percentage of emergency fees, a bonus, a salary raise, or other financial compensation. Most graduates anticipating additional pay expected amounts ranging from $2,500 to $5,000.

*Table 3—Educational debt of 1987 US veterinary medical college graduates**

Debt ($)	Relative frequency (%)	Cumulative frequency† (%)
0	16.3	100.0
1 to 5,000	7.0	83.7
5,001 to 10,000	6.5	76.7
10,001 to 15,000	7.3	70.2
15,001 to 20,000	13.3	62.9
20,001 to 25,000	16.4	49.6
25,001 to 30,000	13.3	33.2
30,001 to 35,000	6.4	19.9
35,001 to 40,000	5.6	13.5
40,001 to 45,000	2.5	7.9
45,001 to 50,000	2.3	5.4
More than 50,000	3.1	3.1

*Total respondents = 1,288. †Cumulative frequency percentages represent the percentage of graduates with debt in excess of the corresponding next lowest debt interval; eg, 62.9% of the graduates reported debt in excess of $15,000.

Educational debt

All graduates were requested to indicate what their total education indebtedness would be upon graduation. For the 1,078 graduates (84%) who indicated having educational debt, the mean debt was $24,667, up 5.3% from 1986. The relative frequency distribution showed that 63% of 1987 graduates, compared with 58% of 1986 graduates, had educational debt in excess of $15,000 (Table 3).[1] Mean educational debt also was determined by the type of employment graduates accepted at the time of the survey (Table 4).

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Table 4—1987 Educational debt of 702 US veterinary medical college graduates, by type of employment

Debt ($)	LAE	LAP	MA	SAP	SAE	EP	U	FG	MS	SLG	IC	AS	SE	Other
1 to 5,000	1	3	9	10	28	3	...	1	2	...	...	6	2	...
5,001 to 10,000	1	4	8	8	28	2	...	...	...	...	...	6	1	...
10,001 to 15,000	3	4	5	10	25	3	1	...	2	...	...	8	...	1
15,001 to 20,000	3	13	15	14	33	3	2	...	3	...	1	20	6	2
20,001 to 25,000	1	14	22	14	48	7	2	1	1	...	1	18	4	1
25,001 to 30,000	1	12	21	16	44	1	2	...	1	1	...	9	4	...
30,001 to 35,000	2	7	8	3	19	1	...	...	...	...	...	5	3	...
35,001 to 40,000	...	8	3	2	13	1	...	...	1	...	...	9	3	...
40,001 to 45,000	...	6	2	...	10	...	...	...	...	...	...	2	...	...
45,001 to 50,000	...	1	1	3	8	3	...	...	1	...	...	1	1	...
More than 50,000	...	1	4	4	14	1	1	...	...	...	...	4	...	...
Total	12	73	98	84	270	25	8	2	11	1	2	88	24	4
Mean	$19,708	$26,173	$23,988	$22,950	$24,410	$24,140	$32,500	$14,000	$21,220	$26,000	$21,500	$24,550	$25,500	$20,000

LAE = Large animal exclusive; LAP = Large animal predominant; MA = Mixed animal; SAP = Small animal predominant; SAE = Small animal exclusive; EP = Equine predominant; U = University; FG = Federal government; MS = Military service; SLG = State/local government; IC = Industrial/commercial; AS = Advanced study; SE = self-employed.

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Employment of 1987 male and female graduates of US veterinary medical colleges

On the basis of the 1987 AVMA survey of 1,288 graduates of US veterinary medical colleges, it was estimated that 80% of the graduates accepted positions as private practice employees at a mean annual salary of $22,152.[1] This report describes in detail the employment choices of 1987 male and female veterinary medical college graduates.

Type of employment

Of the 1,288 graduates responding to the 1987 AVMA survey, 46% were women and 54% were men. Table 1 shows the proportion of graduates receiving offers of employment upon graduation. Excluding graduates entering advance study programs (graduate degrees, internships, or residencies), only 81% of the women received one or more offers of employment, compared with 90% of the men. These percentages are higher than reported for 1986 graduates, which is most likely attributable to the fact that the 1987 survey was conducted approximately one month later in the spring than in 1986.[2]

Regarding graduates who had accepted employment (65%), 93% of the women and 99% of the men would work full-time, whereas 7% of the women and 1% of the men would work part-time. Of the 32 graduates indicating part-time employment, 25 (78%) were women, and 7 (22%) were men.

The distribution of female and male graduates was determined according to type of full-time employment (Table 2). Approximately 79% of female and male graduates accepting full-time employment took positions as employees in private practice. About 14% of the women, compared with 12% of the men, began advanced study programs.

*Table 1—Employment offers: Male and female, 1987**

	Male (n = 608)	Female (n = 519)	Total (n = 1,127)
Received 1 or more offers	90%	81%	86%
Received no offers	10%	19%	14%

*Excludes graduates entering advanced study programs.

Starting salaries

Graduates were asked to report their starting salary (on an annual basis) for full-time employment. Table 3 shows that the mean female graduate's starting salary as a private practice employee was $22,019, about $240 or 1% less than the mean male

Table 2—Full-time employment: Males and females, 1987

	Male (n = 436)	Female (n = 335)
Large animal exclusive (%)	2.0	1.5
Large animal predominant (%)	14.7	2.4
Mixed animal (%)	15.9	10.1
Small animal predominant (%)	12.1	11.3
Small animal exclusive (%)	30.4	52.2
Equine predominant (%)	4.6	1.8
University (research, teaching) (%)	1.2	1.2
Federal government (%)	0.6	—
Military service (%)	1.8	0.9
State/local government (%)	—	0.3
Industry/commercial business (%)	0.2	0.3
Advanced study (%)	11.9	14.3
Self-employed (%)	4.0	3.0
Other employment (%)	0.4	0.6

Table 3—Starting salary by type of practice: Males and females, 1987

	Male	Female
Large animal exclusive	$25,140 (10)	$19,600 (4)
Large animal predominant	$22,281 (73)	$19,757 (7)
Mixed animal	$21,133 (78)	$20,937 (32)
Small animal predominant	$21,957 (56)	$21,135 (37)
Small animal exclusive	$22,732 (146)	$22,649 (168)
Equine predominant	$22,434 (23)	$19,883 (6)
All practice types	$22,255 (386)	$22,019 (254)

Figures in parentheses = No. of graduates reporting full-time employment and starting salary.

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Table 4—Fringe benefits of full-time employed graduates: Male and female, 1987

	Male (n = 496)	Female (n = 335)	Total (n = 831)
Life insurance (%)	25	21	23
Medical/hospital plan (%)	61	58	60
Dental plan (%)	11	10	11
Pension plan (%)	12	6	10
Profit sharing plan (%)	13	11	12
Disability insurance (%)	29	24	27
Liability insurance (%)	53	49	51
Association dues (%)	43	39	41
Continuing education (%)	62	59	61
Annual vacation leave (%)	75	75	75
Sick leave (%)	41	39	40
Housing/apartment (%)	5	5	5

graduate's starting salary as a private practice employee. In mixed animal and in small animal exclusive practices, women and men had nearly identical mean salaries. In other types of private practice, however, men would earn higher salaries on average, by amounts ranging from about $820 in small animal predominant to more than $5,000 in large animal exclusive practice. The survey did not secure information on each graduate's responsibilities or hours worked in the new job, thus, it is not possible to draw conclusions from these survey data about reasons associated with varying salary levels between male and female graduates.

Fringe benefits

All graduates were asked to indicate which of 12 fringe benefits would be provided by their new employer. Table 4 shows the percentage of male and female graduates who accepted full-time employment receiving each of the fringe benefits. The percentages of men and women receiving fringe benefits were similar. Approximately 58% of the women and 61% of the men would be covered by a medical/hospital plan, 75% of women and men would receive annual vacation leave, and 59% of women and 62% of men would have employer-paid continuing education expenses.

Graduate characteristics

Responding graduates provided information on personal characteristics such as age, marital status, and number of children (Table 5). The mean age of females and males was 27 years. Regarding marital status, 64% of female graduates were single, 31% were married, and 4% were divorced. Of the male graduates, 47% were single, 51% were married, and 2% were divorced. About 6% of the women and 20% of the men had one or more children.

Table 5—Personal characteristics: Male and female, 1987

	Male	Female	Total
Mean age (yr)	27	27	27
Marital status			
Single (%)	47	64	55
Married (%)	51	31	42
Divorced (%)	2	4	3
Graduates with children (%)	20	6	13

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BPA

Animal health expenditures by livestock producers

In conjunction with the recent American Veterinary Medical Association study on the US market for food animal veterinary medical services, a national survey of livestock producers was conducted in 1986 to secure veterinary medical service and product expenditure data.[1,2] Analysis of the survey was based on 2,044 usable questionnaires, including 894 primarily beef producers, 417 dairy producers, 338 hog producers, and 395 sheep producers.

Livestock production expenses vary by size of the operation. Tables 1 through 4 show the variation in use of veterinarians and animal health expenses according to size of herd for all 4 types of livestock operation. For this analysis, operations were categorized according to 3 herd sizes: 1 to 49 animals, 50 to 99 animals, and ≤100 animals.

In all types of livestock operations, expenses for animal health products and services increase with greater herd sizes. Most of the increase, however, is in product expenses rather than service expenses.

Regarding hog producers, for example, Table 3 shows that total animal health expenses increase from $550 for 1-to-49-animal operations to $2,000 for ≥100-animal operations. For the same 2 herd-size classes, animal health product expenses increased from $400 to $1,660. While the small producer spends fewer dollars on animal health than does the large producer, the small producer spends only 73 cents of his animal health dollar on products, whereas the large producer spends 83 cents on products.

Another way to view the increased emphasis on animal health products is through the use of the ratio of product expenses to service expenses. For a small hog operation, the ratio was 2.7:1 ($400/$150). For larger hog operations, the product-to-service expense ratio was 4.9:1 ($1,660/$340). These data show that owners of larger operations tend to spend more of their animal health dollar on products than do owners of smaller operations. This is also true for beef, dairy, and sheep producers.

Tables 1 through 4 also show that owners of various-sized operations spend various proportions of their animal health dollar with the veterinarian. As operations grow, producers spend less money on services and more on products. As a result, veterinarians' revenues from large operations are based more on product sales than on services.

Using beef operations as an example, Table 2 shows that annual expenses for veterinary ser-

Prepared by J. Karl Wise, PhD, Wisemark Associates, PO Box 681189, Schaumburg, IL 60168-1189.

*Table 1—Beef producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	25	65	200
Times used veterinarian/yr	3	4	6
Expenses/year with veterinarian	$250	$375	$1,000
Animal health expenses			
Animal health products	$165	$350	$930
	(55%)	(64%)	(69%)
Animal health services	$135	$200	$420
	(45%)	(36%)	(31%)
Total	$300	$550	$1,350

*All values are medians.

*Table 2—Dairy producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	38	65	138
Times used veterinarian/yr	15	20	25
Expenses/year with veterinarian	$800	$1,500	$3,050
Animal health expenses			
Animals health products	$500	$870	$2,000
	(50%)	(50%)	(57%)
Animal health services	$500	$865	$1,500
	(50%)	(50%)	(43%)
Total	$1,000	$1,735	$3,500

*All values are medians.

*Table 3—Hog producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	30	60	315
Times used veterinarian/yr	5	6	6
Expenses/year with veterinarian	$292	$700	$800
Animal health expenses			
Animal health products	$400	$775	$1,660
	(73%)	(69%)	(83%)
Animal health services	$150	$350	$340
	(27%)	(31%)	(17%)
Total	$550	$1,125	$2,000

*All values are medians.

*Table 4—Sheep producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	30	60	170
Times used veterinarian/yr	4	5	6
Expenses/year with veterinarian	$200	$300	$600
Animal health expenses			
Animal health products	$170	$425	$700
	(60%)	(69%)	(70%)
Animal health services	$112	$187	$300
	(40%)	(31%)	(30%)
Total	$282	$612	$1,000

*All values are medians.

vices increased from $250 for 1-to-49-animal operations to $1,000 for ≥100-animal operations. Assuming that all the animal health services were performed by veterinarians, the proportion of veterinarian expenditures attributable to services was 54% ($135/$250) for 1-to-49-animal operations, and 42% ($420/$1,000) for ≥100-animal operations. Beef producers' animal health expenses to the veterinarian increased, but not by as much as total animal expenses; most of the veterinarians' gain in expenses came from product purchases rather than service utilization.

Dairy producers spend the most money of any type of producer on animal health products and services, regardless of size of operation. For the 1-to-49-animal operation, $1,000 was the median amount spent on animal health products and services—$500 on products and $500 on services; of the $1,000, $800 was spent with the veterinarian: $500 (62%) of that was attributable to service, leaving $300 in product purchases from the veterinarian. For the ≥100-animal operation, the producer spent $3,050 with the veterinarian, of which $1,500 (49%) was service expenditures, leaving $1,550 in product purchases from the veterinarian. Since dairy producers with ≥100-animals spent $2,000 on products, 75% of dairy producers' product purchases were with veterinarians.

In general, owners of larger livestock farms and ranches spend proportionately more on animal health products and proportionately less on animal health services than do owners of smaller operations. In addition, owners of larger livestock operations spend proportionately less of their animal health dollar with the veterinarian than do owners of smaller livestock operations. A corollary conclusion is that product expenditures are a greater proportion of the total veterinarian expenses for larger operations than for smaller operations.

Table 5 shows producers' animal health product purchases by supplier. The veterinarian receives about 42 cents of every dollar spent for animal health products by the average beef producer. Likewise, the veterinarian receives 53 cents of the dairy producers' animal health product dollar, 34 cents of the hog producers' animal health product dollar, and 28 cents of the sheep producers' animal health product dollar.

The feed store/dealer receives the second highest share of producers' animal health product expenses, with the exception of

Table 5—Percentage of 1985 animal health product expenses, by supplier

	Beef	Dairy	Hog	Sheep
Veterinarian	42	53	34	28
Feed store/dealer	34	22	40	25
Mail order distributor	8	11	8	35
Cooperative	10	8	10	6
Traveling distributor	4	4	6	2
Other supplier	2	2	2	4
Total	100%	100%	100%	100%

Table 6—Average service and product expenses with veterinarian and number of operations that used a veterinarian, 1985

	Total market veterinarians (millions)		Average* service + product expense at veterinarian		Farms that purchased from a veterinarian (thous)		Total No. livestock farms (thous)
Beef producers	$214.9	+	$315	=	682.2	71%†	957.7
Dairy producers	$300.9	+	$1,090	=	276.0	99%	277.8
Hog producers	$98.0	+	$524	=	187.0	57%	329.8
Sheep producers	$24.2	+	$310	=	78.1	77%	101.6
Total	$638.0	+	$522	=	1,223.3	73%	1,666.9

*Weighted average expense based on average veterinary expenses according to population of livestock operations of various herd sizes.

†Estimated percentage of farm operations using a veterinarian.

hog producers. For every dollar spent on animal health products, the hog producer spends 40 cents at the feed store, and only 34 cents with the veterinarian.

Average annual veterinary service and product expenditures were developed from the national survey of livestock producers and were weighted by the US populations of livestock operations and their distributions according to herd size of operation.

Table 6 reveals that, in 1985, 71% of beef producers used a veterinarian and spent $315, on average, for the year. Very nearly all dairy producers were estimated to have purchased services and/or products from a veterinarian, with an average annual expenditure of $1,090/producer. Hog producers were estimated to not use a veterinarian as much as other livestock producers. Only 57% of hog producers used a veterinarian for services or product purchases, with an annual expenditure of $524/producer. Approximately 78% of sheep producers used a veterinarian, with an average annual expenditure of $310 per sheep producer.

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2. Wise JK. *The US market for food animal veterinary medical services.* Schaumburg, Ill: American Veterinary Medical Association, 1987.

Book Review: Veterinary Epidemiology: Principles and Methods

This book is a welcome addition to the limited selection of veterinary epidemiology texts. It is comprehensive and thorough in its coverage and provides the basis for a 60- to 80-hour course. Epidemiologic methods are discussed in the content of specific veterinary applications in population medicine. The first section, "Basic Principles", discusses sampling strategies, measures of disease frequency, and evaluation of diagnostic test performance. The second section, "Studying Disease in Animal Populations", discusses medical ecology and measures of disease occurrence, estabishing cause, study designs, and systems analysis. The last 2 sections, "Animal Health Economics" and "Applied Epidemiology", deal with economic analysis, disease control strategies, and surveillance. Topics are frequently cross-referenced. The index is extensive, although some terms used in the text are not referenced. The chapter on "Animal Health Economics" is outstanding. It provides an excellent example of how to apply epidemiologic analyses to economic decision-making. Some methodologic issues may be difficult for veterinary students to follow without further explanation. An introduction to descriptive and inferential biostatistics would have been helpful for understanding the statistical analyses. There is limited discussion of the application of epidemiology to medical decision-making at the individual animal vs the herd level. However, examples easily could be developed by instructors. In light of the dearth of comprehensive veterinary epidemiology texts, this book should be of interest to veterinary professional and graduate students, researchers, and practitioners.—[*Veterinary Epidemiology: Principles and Methods. By S. Wayne Martin, Alan H. Meek, and Preben Willeberg. 343 pages; illustrated. Iowa State University Press, 2121 S State Ave, Ames, IA 50010. 1987. Price $30.95.*]—R. D. SMITH

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VBPA

1987 AVMA Activities Summary

Membership

AVMA's membership increased by 4.5% to 45,622 members at the end of 1987. The 2,676 new members include 2,203 new graduates. Of the 2,216 graduates of US veterinary colleges during 1987, 2,203 (99.9%) joined the AVMA. All of the graduates from 20 veterinary colleges joined the Association. The Association lost 836 members during the year, as follows: death (170), resignation (67), and nonpayment of dues (599). As shown in the table below left, 77.3% of the US members are in private practice; 7.6% are active in academic disciplines and clinical specialties; 7.9% are involved in public health, regulatory, military, and other activities; 4.6% are retired; and 2.6% (mostly new graduates) are in unknown activities.

AVMA Membership According to Professional Activity—Dec 31, 1987

Bovine practice (exclusive)	419
Equine practice (exclusive)	1,908
Porcine practice (exclusive)	56
Large animal practice (all species)	1,457
Mixed practice (predominantly large animal)	4,590
Mixed practice (50-50 large and small)	3,318
Mixed practice (predominantly small animal)	4,964
Small animal practice (exclusive)	18,388
Poultry practice (exclusive)	79
Feline practice (exclusive)	64
	35,243
Anatomy	96
Biochemistry	11
Microbiology	275
Parasitology	71
Pathology	876
Pharmacology	74
Physiology	114
Radiology	125
Toxicology	146
Surgery	312
Pathology, Avian	97
Pathology, Clinical	118
Ophthalmology	109
Nutrition	54
Clinician	376
Theriogenology	137
Anesthesiology	73
Internal Medicine	121
Cardiology	18
Dermatology	36
Neurology	25
Epidemiology	52
Oncology	25
Aquatic	27
Avian medicine	91
Ethology	5
	3,464
Veterinary public health	196
Veterinary preventive medicine	55
Teaching and research	396
Regulatory veterinary medicine	667
Administrative	154
Laboratory animal medicine	560
Wildlife, zoo and fur-bearing animals	187
Extension veterinary medicine	61
Diagnostic veterinary medicine	169
Industrial veterinary medicine	295
Military veterinary service	401
Animal technician educator	60
Other veterinary medicine	425
	3,626
Retired	2,105
Unknown professional activity	1,184
Total membership	45,622

Public Information

Media relations

The AVMA prepared and distributed numerous news releases detailing a variety of animal, public health, and Association issues in 1987. Twenty-five separate news releases on food animal topics were distributed to over 5,000 agricultural writers, editors, and broadcasters. The news releases were read by over 5 million people.

In addition to news releases, the AVMA provided editorial assistance to the 3 network television stations, the Public Broadcasting System, radio programs, newspapers, and magazines. Contacts included: United Press International, Associated Press, *New York Times*, *Washington Post*, *USA Today*, *Woman's Day*, *Country Living*, *Ladies Home Journal*, *Glamour Magazine*, *The Chicago Tribune*, *Los Angeles Times*, *DVM Magazine*, *Veterinary Economics*, *Dog World*, and *Success Magazine*.

Media Guide to Veterinary Sources and Information contains the names of 361 contact people for veterinary associations, specialty boards, federal agencies, and colleges of veterinary medicine. Over 5,000 copies were distributed to newspapers, television stations, networks, wire services, magazines, writers, editors, and syndicates.

Animal Health News and Feature Tips was distributed quarterly to over 5,000 media outlets. Almost 200 news and feature tips included stories about research programs at veterinary schools, information on veterinary meetings, AVMA activities, seasonal health tips, and other animal health news items that would be

1987–1988 AVMA officers are (l to r) Drs. Owen Stevens, Jr, treasurer; Walter Martin, Jr, president-elect; Richard Fink, president; Jesse Derrick, vice president, and Arnold Hentschl, Executive Board chairman.

Dr. Steve Arnoczky, a diplomate of the American College of Veterinary Surgeons, was the recipient of one of the biggest research awards in the field of orthopedics. He was awarded the Kappa Delta Young Investigators Award from the American Academy of Orthopedic Surgeons, for his significant contribution to orthopedic research. Dr. Arnoczky is the first veterinarian to win the annual award and was one of four individuals to be chosen by the academy to receive the award.

Swine Practitioners, and the American Association of Sheep and Goat Practitioners.

Speakers were Drs. Jack Morse, private practitioner, Turlock, Calif; Dan Upson, Kansas State University; James Reid, private practitioner, Vienna Va; Thomas Powers, The Ohio State University; William Jenkins, Texas A&M University; C. M. Stowe, Jr., University of Minnesota; Dwight Mercer, Mississippi State University; and R. E. Engel, USDA Food Safety and Inspection Service.

Proceedings of the symposium were published in the January 15, 1988 issue of JAVMA.

Electroimmobilization Devices

Advised that the use of electrical immobilization appears to have noxious effects on animals, the Council on Biologic and Therapeutic Agents recommended against the use of such devices for major procedures. Electrical currents have been known to induce analgesia. However, conventional anesthetic techniques using drugs were found to be more consistent and to provide better muscle relaxation.

Veterinary Specialty Organizations

As of Jan 1, 1988 annual reports from the 14 recognized specialty organizations indicate that there were 3205 certified veterinary specialists in the United States, representing nearly 7% of the total AVMA membership. A total of 243 new diplomates were added during 1987.

A total of 13 specialty organizations are fully recognized by the AVMA House of Delegates, while the American College of Zoological Medicine continues to be provisionally recognized.

At its April 1987 meeting, the Advisory Board on Veterinary Specialties (ABVS) recommended provisional recognition to the specialty of veterinary medical oncology as an affiliate specialty organization under the umbrella of the American College of Veterinary Internal Medicine. This action will become effective when the 1988 AVMA House of Delegates acts on the recommendation.

The American College of Veterinary Nutrition (ACVN) also presented a petition for provisional recognition. Following submission of additional information, the petition was granted and the recognition of the new specialty will also be considered by the 1988 AVMA House of Delegates at its July 1988 meeting.

The list of currently recognized veterinary specialty organizations and their active membership follows:

American Board of Veterinary Practitioners	205
American Board of Veterinary Toxicology	61
American College of Laboratory Animal Medicine	347
American College of Theriogenologists	193
American College of Veterinary Anesthesiologists	64
American College of Veterinary Dermatologists	43
American College of Veterinary Internal Medicine	386
Specialty of Cardiology	47
Specialty of Neurology	40
Specialty of Internal Medicine	332
American College of Veterinary Microbiologists	158
American College of Veterinary Ophthalmologists	104
American College of Veterinary Pathologists	830
American College of Veterinary Preventive Medicine	346
*Specialty of Epidemiology	10
American College of Veterinary Radiology	120
American College of Veterinary Surgeons	327
American College of Zoological Medicine	21
†Total	3,205

*All are also members of ACVP †Some members belong to 2 specialties

Continuing Education

Thirty-three years of committed action and leadership by the AVMA Continuing Education Advisory Committee (CEAC) culminated in the presentation of the 9th Forum on Veterinary Continuing Education (VCE) at the 1987 AVMA convention. The forum highlighted new developments in veterinary medical continuing education, including presentations on alternate therapies, career change, and marketing. Culmination of the forum was the presentation of the Veterinary Continuing Educator of The Year Award to Dr. William F. Jackson,

Economic Note

Livestock producers' attitudes about food animal veterinarians

In 1986, in conjunction with the American Veterinary Medical Association study on the US market for food animal veterinary medical services, a national survey of livestock producers was conducted.[1,2] Analysis of the survey was based on 2,044 usable questionnaires, including 894 primarily beef producers, 417 dairy producers, 338 hog producers, and 395 sheep producers.

In order to determine how producers perceived the importance of a local veterinarian to their farm or ranch operation, producers were asked about 2 sets of statements. The first set of statements focused on 8 services provided by local veterinarians. Respondents indicated whether the service was very important, somewhat important, or not important to their livestock operation.

In general, producers reported that the local veterinarian was very important or somewhat important to their livestock operation. An analysis of each service, however, revealed that there was variation in the importance placed on particular services provided by veterinarians (Table 1).

Approximately 80% of the beef producers, 90% of the dairy producers, and 77% of the hog producers indicated that the local veterinarian was very important for diagnosis and treatment of sick or injured animals. Only 65% of sheep producers believed that the local veterinarian was very important for diagnosis and treatment.

Regarding purchases of animal vaccines and medications/antibiotics, local veterinarians were considered to be very important by 5 of 10 beef producers, 6 of 10 dairy producers, at least 4 of 10 hog producers, and at least 3 of 10 sheep producers.

Herd health management advice and information on reproductive problems were considered very important services provided by local veterinarians by nearly 5 of 10 beef and hog producers, nearly 7 of 10 dairy producers, but only 3 of 10 sheep producers.

Regarding information on feed and nutrition, fewer than 1 in 8 of all producers reported that the local veterinarian was very important to their operation. More specifically, nearly 1 of 3 beef and hog producers, 1 of 4 dairy producers, and 1 of 2 sheep producers reported that the local veterinarian was not important to their operation.

The second set of statements involved a series of statements for which respondents were asked to indicate whether they agreed strongly, agreed, disagreed, or disagreed strongly. For this analysis, agree strongly and agree were collapsed to simply "agree"; disagree and disagree strongly were collapsed to "disagree" (Table 2).

Table 1—Producers' importance of local veterinarian to the livestock operation*

	Beef			Dairy			Hog			Sheep		
	V	S	N	V	S	N	V	S	N	V	S	N
Diagnosis of sick or injured animals	80	18	2	90	9	1	77	19	4	63	31	6
Required regulatory testing	53	30	17	55	33	11	44	33	23	46	27	27
Information on feed and nutrition	14	54	32	17	60	23	12	55	33	10	41	49
Purchases of animal vaccines	51	37	13	63	26	11	49	37	14	34	44	21
Purchases of medications/antibiotics	53	36	11	55	35	10	44	40	16	36	42	22
Treatment of sick or injured animals	80	17	3	89	10	1	76	20	4	65	30	6
Herd health management advice	45	41	14	65	30	5	49	37	14	32	47	21
Information on reproductive problems	48	36	16	72	24	4	46	40	14	32	45	23

*V = percentage indicated very important; S = percentage indicated somewhat important; N = percentage indicated not important.

Prepared by J. Karl Wise, PhD, Wisemark Associates, PO Box 681189, Schaumburg, IL 60168-1189.

Table 2—Livestock producers' attitudes regarding veterinarians

	Beef		Dairy		Hog		Sheep	
	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)
Local veterinarians know a lot about agribusiness and farm economics	62	38	70	30	65	34	40	61
Veterinarians I have used are good at explaining what they know to me	93	7	93	7	92	8	88	12
Veterinarians I have used are good at listening to me about my operation	89	11	92	8	92	8	86	14
I think of the local veterinarian as a herd management consultant	58	42	75	25	64	36	46	54
Local veterinarians' services are beneficial to me	97	3	98	2	95	4	93	7
I usually call the veterinarian only as a last resort	35	65	20	80	33	67	36	64

Table 3—Producers' overall level of satisfaction with local veterinarian

	Very satisfied (%)	Somewhat satisfied (%)	Somewhat dissatisfied (%)	Very dissatisfied (%)	Average rating*
Beef producers	68	28	?	1	3.6
Dairy producers	70	27	3	...	3.7
Hog producers	57	39	3	1	3.5
Sheep producers	53	38	7	2	3.4

*4 = very satisfied; 1 = very dissatisfied.

Approximately 60 to 70% of beef, dairy, and hog producers agreed with the statement that local veterinarians know a lot about agribusiness and farm economics. On the other hand, at least 3 of 10 beef, dairy, and hog producers, and 6 of 10 sheep producers disagreed with the statement.

The second and third statements in Table 2 are positive statements about food animal veterinarians' communications skills of explaining and listening. Most producers, roughly 90%, agreed that local veterinarians were good at explaining what they know to them and were good at listening to them about their operation.

The fourth and fifth statements in Table 2 are positive statements about the value of veterinarians' services to the livestock producer. More than 9 of 10 producers agreed that the local veterinarian's services were beneficial to them. Moreover, roughly 6 of 10 beef and hog producers think of the local veterinarian as a herd management consultant. Not quite 5 of 10 sheep producers felt this way, but as many as 3 of 4 dairy operators did agree that the local veterinarian was a herd management consultant.

Regarding the last statement, "I usually call the veterinarian only as a last resort," approximately 1 of 3 beef, hog, and sheep farm and ranch operators agreed; only 1 of 5 dairy farm operators agreed.

In conclusion, the majority of producers had positive attitudes about local veterinarians, their abilities in diagnosis and treatment, and their communication skills regarding listening to producers' problems and explaining what they know.

Producers indicated that veterinarians were only somewhat important for purchases of antibiotics and vaccines, for herd health management, and for reproductive advice. Veterinarians were not considered important for information on feed and nutrition. While most producers had positive attitudes toward veterinarians, roughly 1 of 5 dairy producers and 1 of 3 other livestock producers would call the veterinarian only as a last resort.

Table 3 summarizes producers' responses to a general question, "Considering everything, how satisfied or dissatisfied are you with the veterinarian you use?" Dairy producers showed the highest level of satisfaction, followed by beef producers, hog producers, and last, sheep producers.

On the survey, producers also were invited to comment on what they thought were their local veterinarian's strongest and weakest points. Hundreds of written comments were submitted by producers. All comments regarding strengths and weaknesses were categorized as dealing with veterinarians' professional characteristics, with veterinarians' services, or with veterinarians' personal characteristics.

Approximately half of the respondents wrote about veterinarians' professional strengths, commenting most frequently on the veterinarian making good diagnoses and treatments, being smart, knowledgeable, and experienced. Most frequently mentioned strengths associated with professional services were promptness and availability. Approximately 25% of the producers commented on the veterinarian's personal characteristics, such as courteousness, friendliness, "really cares," good personality, cooperative, and helpful.

Fewer respondents submitted comments about local veterinarians' weakest points. Of the 25% who did respond, comments varied from poor diagnosis and explains things poorly to hardly available and always in a hurry. Many sheep producers commented that the local veterinarian had no experience with sheep.

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Economic Note

Livestock producers' ratings of alternative veterinary information sources

In conjunction with the 1987 American Veterinary Medical Association study on the US market for food animal veterinary medical services, a national survey of livestock producers was conducted.[1,2] In addition to securing data on producers' animal health expenditures, information also was collected on producers' opinions about their veterinarians' (and their own) knowledge of several subject areas. Analysis of the survey was based on 2,044 usable questionnaires, which included 894 primarily beef producers, 417 dairy producers, 338 swine producers, and 395 sheep producers.

Prepared by J. Karl Wise, PhD, Wisemark Associates, PO Box 681189, Schaumburg, IL 60168-1189.

Ratings of knowledge

Livestock producers were asked to rate the following individuals:

- Feed salesman
- Local veterinarian
- Farm store specialist
- Traveling distributor
- Extension veterinarian
- Agricultural extension agent
- Artificial insemination technician
- You or your manager

for their knowledge of 6 subject or problem areas:

- Animal/herd management
- Feed/nutrition
- Diagnosis of sickness or injury
- Reproduction/breeding
- Agribusiness/economics
- Treatment of sickness or injury.

Ratings for each individual as a source of knowledge were based on a scale of 1 to 5, with 1 being low knowledge and 5 being high knowledge. For purposes of comparison, the respondents also were asked to rate themselves or their livestock enterprise manager (you or your manager).

The ratings represent the livestock producer's perception of knowledge of each potential source of assistance. It is perceived knowledge that determines who the producer contacts for assistance, regardless of whether the perception is accurate.

Table 1 summarizes the producer's average knowledge rating of the local veterinarian and that of the producer himself or his enterprise manager, and indicates

Table 1—Producers' mean knowledge rating of veterinarian, producer, and highest-rated alternative

	Animal/herd management	Feed nutrition	Diagnosis of sickness or injury	Reproduction/ breeding	Agribusiness/ economics	Treatment of sickness or injury
Beef producer						
Local veterinarian	3.9*	3.7	4.5	4.2	2.9	4.5
Producer or manager	3.9†	3.5	3.3	3.5	3.6	3.5
Highest alternative	3.2 D‡	3.8 A	3.4 D	3.6 F	3.2 E	3.3 D
Dairy producer						
Local veterinarian	4.0	3.6	4.7	4.5	2.8	4.6
Producer or manager	4.0	3.6	3.5	3.5	3.8	3.5
Highest alternative	3.2 D,E	4.0 A	3.4 D	4.0 F	3.6 E	3.4 D
Hog producer						
Local veterinarian	3.9	3.6	4.6	4.0	2.9	4.6
Producer or manager	4.0	3.6	3.5	3.6	3.6	3.6
Highest alternative	3.3 D	4.0 A	3.3 D	3.5 F	3.2 E	3.4 D
Sheep producer						
Local veterinarian	3.3	3.2	4.3	3.8	2.4	4.4
Producer or manager	4.1	3.7	3.6	3.9	3.5	3.8
Highest alternative	3.2 D	3.4 A	3.4 D	3.3 D	3.1 E	3.4 D

*Surveyed producers rated veterinarians' knowledge of each subject area on a scale of 1 to 5, with 1 = low knowledge to 5 = high knowledge. †Mean knowledge rating, by producers, of their own knowledge. ‡Mean knowledge rating, by producers, of highest alternative to veterinarian or themselves.

A = feed salesman; B = farm store specialist; C = traveling distributor; D = extension veterinarian; E = agricultural extension agent; F = artificial insemination technician/breeder.

the highest rated alternative to either the local veterinarian or the producer.

All livestock producers ranked veterinarians highest on their knowledge of diagnosis and treatment of sickness and injury, compared with other sources of help. For example, the dairy producers' average rating of the local veterinarian for diagnosis was 4.7, and for treatment, 4.6. The sheep producers' average ratings of the local veterinarian were 4.3 and 4.4 for diagnosis and treatment, respectively. Ratings by all producers for the local veterinarian for these 2 areas ranged from 4.3 to 4.7.

For diagnosis and treatment, dairy producers' average rating of their own knowledge or their managers' knowledge was 3.5. For all producers, the average rating of producer's knowledge of diagnosis and treatment ranged from 3.3 to 3.8.

All respondents rated the extension veterinarian as the highest-rated alternative source for knowledge of diagnosis and treatment, with ratings that ranged from 3.3 to 3.4.

Regarding diagnosis and treatment of sickness and injury, these data reflect producers' perceptions that the local veterinarian is the most knowledgeable. Producers rated themselves about 1 point lower on the 5-point scale and rated extension veterinarians, on average, 0.1 to 0.4 lower than themselves. The only exception for this was beef producers, who rated extension veterinarians slightly higher than themselves for diagnosis.

Regarding animal/herd management, beef, dairy, and hog producers rated local veterinarians and themselves nearly the same, at about 3.9 to 4.0. Sheep producers rated local veterinarians at 3.3, compared with themselves at 4.1. Extension veterinarians were the highest-rated alternative, at about 3.2 for all producers, approximately 0.7 less than the producer. These data suggest that producers perceive themselves knowing as much about livestock herd management as the local veterinarian and more than any other individual available as a source of information.

Regarding the subject of feed and nutrition, dairy and hog producers rated themselves and the local veterinarian as 3.6. Beef producers rated the local veterinarian 0.2 higher than themselves, and sheep producers rated the local veterinarian 0.5 lower than themselves. With the exception of sheep producers, livestock producers perceived the feed salesman as having greater knowledge of feed and nutrition than either the local veterinarian or themselves. Sheep producers felt that their knowledge was greater than either the local veterinarian or the feed salesman.

In the area of reproduction and breeding, all but the sheep producer rated the local veterinarian highest in knowledge, particularly dairy producers, who rated veterinarians at 4.5 in that area. Dairy producers rated themselves about 0.7 to 1.0 lower, at about 3.5. The artificial insemination technician/breeder was the highest-rated alternative, but for all producer groups was lower than the local veterinarian. Sheep producers rated the local veterinarian 0.1 lower than themselves.

All 4 producer groups perceived the local veterinarian as having less knowledge of agribusiness and economics than themselves. While their self-ratings ranged from 3.5 for sheep producers to 3.8 for dairy producers, local veterinarians were rated at about 2.8 to 2.9. All producers perceived the agricultural extension agent as having greater knowledge (3.1 to 3.6) than the local veterinarian.

From these survey data, it is concluded that beef, dairy, and hog producers perceive local veterinarians as strong in their diagnosis and treatment of sickness and injury, and also in reproduction and breeding. Regarding animal herd management and feed/nutrition, local veterinarians are perceived to possess about the same level of knowledge as the producer himself or the operation manager. Feed salesmen are perceived to have slightly greater knowledge of feed/nutrition relative to local veterinarians and the producer. The local veterinarian's knowledge of agribusiness and economics was perceived as relatively weak compared with the producer's own knowledge and that of the agricultural extension agent. Sheep producers perceived that local veterinarians possessed greater knowledge of diagnosis and treatment of sickness and injury, but veterinarians were not perceived to be particularly knowledgeable in the other 4 subject areas.

Order of contact

One indicator of the demand by livestock producers for veterinary services is the order in which producers would contact potential sources of help for specific types of problems. Respondents to the survey of farm and ranch operators were asked to order the individuals as they would be likely to contact them if they had a question or problem. For a given subject area, individuals were ranked from 1 to 7 (1 would be their first contact, 2 would be their second contact, etc). Table 2 summarizes the median ranked order of contact assigned by producers to local veterinarians for each subject or problem area.

Local veterinarians were ranked as the first contact for diagnosis and treatment of sickness or injury, and for questions or problems in reproduction and breeding. Approximately 3 of 4 producers reported that they would be likely to contact a local veterinarian first if they had a question or problem which they felt related to diagnosis or treatment of an animal's condition. About 2 of 4 producers would contact a local veterinarian first for a question or problem related to reproduction or breeding.

Table 2—Ranked order of contact for a local veterinarian by livestock producers

	Animal/herd management		Feed nutrition		Diagnosis of sickness or injury		Reproduction/ breeding		Agribusiness/ economics		Treatment of sickness or injury	
	Rank*	1† (%)	Rank	1 (%)	Rank	1 (%)	Rank	1 (%)	Rank	1 (%)	Rank	1 (%)
Beef producer	2	33	2	15	1	74	1	48	4	6	1	72
Dairy producer	2	34	2	13	1	77	1	51	4	5	1	75
Hog producer	1	40	2	11	1	75	1	51	3	6	1	74
Sheep producer	2	25	3	12	1	75	1	43	4	3	1	72

*Rank = the median rank order of contact, ie, the rank on a scale of 1 to 7 (1 = first contact . . . 7 = seventh contact) by which 50% of producers would contact a local veterinarian. †1 = the percentage of producers that would contact a local veterinarian first for a question or problem in a subject area.

For questions or problems related to herd management and feed or nutrition, local veterinarians were ranked as the second contact by all but the hog producers, who ranked local veterinarians first for animal herd management. In contrast to the majority of producers who would contact a local veterinarian first for diagnosis and treatment problems, only 1 out of 3 producers reported they would be likely to contact a local veterinarian first for a question or problem related to animal herd management. For a question on feed or nutrition, barely more than 1 of 10 producers would contact the local veterinarian first.

For agribusiness or economics, veterinarians' median ranked order of contact was fourth for beef, dairy, and sheep producers, and third for hog producers. Approximately 1 of 20 producers reported that they would be likely to contact a local veterinarian first.

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1. Wise JK. US market for food animal veterinary medical services. *J Am Vet Med Assoc* 1987;190:1530–1533.

2. Wise JK. *The US market for food animal veterinary medical services.* Schaumburg, Ill: American Veterinary Medical Association, 1987.

Effects of single-dose and three-day trimethoprim-sulfadiazine and amikacin treatment of *Escherichia coli* urinary tract infections in dogs

Efficacy of single-dose and 3-day trimethoprim-sulfadiazine (TMS) and amikacin treatment regimens for induced *Escherichia coli* urinary tract infections (UTI) in dogs was evaluated. Using each regimen, effects of giving the TMS/amikacin combination or amikacin alone were compared in males and females, and the response of treated dogs was compared with that of nontreated controls.

Before treatments, magnitudes of bacteriuria were similar in all experimental groups, and UTI persisted in all nontreated dogs. Single-dose treatment regimens did not reliably eradicate UTI in males or females, whether amikacin or TMS was administered. Magnitude of bacteriuria often diminished immediately after single-dose treatment, and such reductions of bacteriuria persisted in 2 of 8 dogs. However, no males and only 1 of 4 females became abacteriuric after a single-dose treatment regimen. The single female in which UTI was eradicated was treated with a single dose of amikacin.—*K. S. Rogers, G. E. Lees, and R. B. Simpson in Am J Vet Res 49 (March 1988).*

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About the cover

"Romping" was painted by David Acuff in 1987. This 80- × 40-inch watercolor, which was painted on the request of Mack and Parker Inc, features Secretariat in his most common position, at the head of the pack, as he romps with two other Thoroughbreds. The bold patterns, strong contrasts, and rich, lively colors are characteristic of the artist's work. Mr. Acuff, who is an associate member of the American Watercolor Society, has exhibited his paintings throughout the Midwest and has received numerous awards. Several of his paintings have been purchased by large, nationally known companies.

"Romping" is displayed at the Chicago offices of Mack and Parker Inc.

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VBPA

Insurance Note

Injuries to people are an ever-present danger

The AVMA Professional Liability Insurance Trust program is affected acutely by claims for bodily injury to people. Included are medical and surgical costs that essentially have no limits, ie, counseling for emotional injury, loss of time from work, and payment demands for pain and suffering related to the injury. Injuries to minors involve other complications, since such claims can remain unresolved until the child reaches adulthood. One such claim was settled recently:

> A veterinarian sold a flea dip in a brown bottle with a label naming the dip, but there was no warning label or child-proof cap. While the mother was treating their dog, her 2-year-old son drank some of the dip, allegedly sustaining respiratory failure, becoming comatose and remaining in a coma for 2 days, and then awakening to hallucinations and nightmares. Further, the child was said to have sustained motor function disability that affects his walking and coordination, and his personality and emotional stability were adversely affected. After 6 years, the claim was settled for $275,000, with the concurrence of the veterinarian, and the Trust's insurer paid $28,323 in legal and other fees as well.

A study of claims for 1976 through 1985 reveals that horses are responsible for 70.6% ($1,156,107) of all dollars paid for human injury ($1,636,768). Human injury claims comprised 15.6% of all claims paid under the Trust program ($10,496,062) during the same period. These payments were for injuries ranging from minor bumps or bruises to complicated fractures and multiple head injuries that caused permanent disability.

Table 1—AVMA Professional Liability Insurance Trust human injury claims, by dollars paid, 1976–1985

	Paid	Legal/other expense	Total
Horses	$1,087,340	$ 68,767	$1,156,107
Cattle	19,336	41,097	60,433
Dogs	122,766	18,750	141,516
Cats	121,912	28,643	150,555
Miscellaneous	119,131	9,026	128,157
TOTAL	$1,470,485	$166,283	$1,636,768

Payment for human injury claims amounts to 15.6% of the total paid for claims from 1976 through 1985 ($10,496,062).

By the very nature of its quickness, size, and overpowering strength, the horse can inflict serious injury without warning. Example:

> A veterinarian sedated a 10-year-old horse in preparation for debridement of granulation tissue from a wound. The procedure was carried out without complications. The veterinarian then initiated routine dental care, upon which the horse resisted, sat down, and rolled onto its left side. Attempting to stand, the horse stumbled a second time and fell again, this time colliding with a young girl. The girl fell under the tailgate of the nearby ambulatory clinic truck, her head hitting the truck with a glancing blow and her left hip striking the ground. Her hip was fractured, and later developed aseptic necrosis of the femoral head, which will require her to have hip replacements every 5 to 10 years. In addition, she will be on crutches for 5 years. With the veterinarian's consent, the Trust insurance company arranged for a settlement of $365,000.

The smaller species, principally cats and dogs, may bite or scratch the face and hands, often requiring extensive reconstructive surgery or tendon sheath drainage to treat puncture wounds. Small animals under tranquilization often become undisciplined. Example:

> A veterinarian administered an injection to a cat being held by its owner. The owner was bitten on a finger, and it later became infected. The owner previously suffered from diabetes mellitus, Parkinson's disease, cardiovascular disease, and chronic urinary bladder problems. Saving the finger from amputation required $30,000 in medical treatment and a resulting some loss of use of the finger. With the Trust member's consent, the claim was settled for $80,000 plus $6,738 for legal and other fees.

A breakdown of human injury claims in the Professional Liability Insurance Trust program, by dollars paid and by species, is given in Table 1.

Whether to allow owners to assist is a major decision all veterinarians face every day. The decision is not easy. In the case of veterinarians who treat horses, for example, experienced horse owners or professional trainers frequently are involved in treatment procedures outside of hospitals. All practitioners, no matter what species they are treating, should use experienced hospital personnel, if possible, particularly in dangerous situations.

Information regarding AVMA's Professional Liability Insurance Trust may be obtained by contacting the Trust Office, PO Box 74221, Chicago, IL 60690 8221. The toll-free telephone number is (800) 621-6360.

Prepared by Karen Katz of Mack and Parker Inc, Chicago, IL 60604, on behalf of the AVMA Professional Liability Insurance Trust.

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VBPA

Enrollment Declines in DVM-Degree Programs, but Increases in MS- and PhD-Degree Programs

While freshman enrollment in US and Canadian veterinary colleges declined somewhat in academic year 1987-1988 and total student enrollment dropped even more, enrollment in graduate-degree and certificate programs rose dramatically.

Statistical information provided by the Association of American Veterinary Medical Colleges indicates that total enrollment in US and Canadian graduate-degree and certificate programs in 1987-1988 is 2,509 (see Table 2), up by 237 participants or 10% over 1986-1987. The 1987-1988 total includes 1,560 participants with and 949 without DVM or VMD degrees or their equivalent.

Freshman enrollment declined by 66 students in the 27 US veterinary colleges and by 7 in the 4 Canadian colleges, from 2,571 in 1986-1987 to 2,498 in 1987-1988. Reflected in the 2,571 figure was the enrollment of 50 students in the charter veterinary class at the Atlantic Veterinary College, University of Prince Edward Island. The college's opening in 1986 resulted in an increase of 28 US and Canadian freshmen students over the preceding academic year.

Total student enrollment in the DVM-degree programs in the United States and Canada decreased by 114 students. For the academic year 1987-1988, 9,854 students were enrolled (see Table 1), including 8,751 in the US colleges and 1,103 in the Canadian colleges. The US enrollment decreased by 136 students over the preceding year.

Another trend that continued was the steady increase in the percentage of female veterinary students enrolled in DVM-degree programs, both in the United States and Canada (see Table 1). Female students began outnumbering their male classmates in 1985-1986, when the US veterinary colleges reported that 50.8% of their total enrollment was women. The following year, that figure climbed to 53%, and in 1987-1988, it is 55.03%. Canadian veterinary colleges are experiencing an even more pronounced increase, from 56.8% to 60.3% to 61.92% for the respective years.

Enrollment by class year is presented in Table 3, and geographic distribution of first-year students in the US veterinary colleges is shown in Table 4. ■

TABLE 1—Total Enrollment in Veterinary Medical Degree Programs

	Male		Female		
	No.	(%)	No.	(%)	Total
United States	3,935	(0.97)	4,816	(0.03)	8,751
Canada	420	(0.08)	683	(0.92)	1,103
Total	4,355	(44.20)	5,499	(55.80)	9,854

TOTAL 2—Total Enrollment in US and Canadian Graduate-Degree and Certificate Programs

Graduate	MS	PhD	Certificate of Internship	Certificate of Residency	Certificate of Residency and MS	Certificate of Residency and PhD	Total
DVM	396	584	108	227	179	66	1,560
Non-DVM	462	487	...	...	...	...	949
Total	858	1,071	108	227	179	66	2,509

TABLE 3—Total Enrollment of Veterinary Medical Degree Students, by Class Year

College	1st Year	2nd Year	3rd Year	4th Year	Total
Auburn University	92	87	75	90	345
California, University of	122	120	123	120	485
Colorado State University	124	126	122	136	508
Cornell University	81	77	79	80	317
Florida, University of	80	76	78	82	316
Georgia, University of	80	81	80	81	322
Illinois, University of	80	87	74	76	317
Iowa State University	98	111	106	113	428
Kansas State University	96	93	92	108	389
Louisiana State University	63	77	79	70	289
Michigan State University	100	101	102	91	394
Minnesota, University of	64	67	78	73	282
Mississippi State University	44	43	30	36	153
Missouri, University of	69	72	70	72	283
North Carolina State University	72	65	72	*69	278
The Ohio State University	128	128	126	129	511
Oklahoma State University	71	70	69	66	276
Oregon State University	36	*	*	35	71
Pennsylvania, University of	109	107	107	106	429
Purdue University	60	58	59	60	237
Tennessee, University of	60	56	57	0	173
Texas A&M University	127	125	125	136	513
Tufts University	67	64	65	62	258
Tuskegee University	59	56	51	55	221
Virginia Polytechnic Institute	80	78	78	79	315
Washington State University	60	98	107	68	333
Wisconsin, University of	85	70	77	76	308
Total Enrollment—US Colleges	2,207	2,193	2,182	2,169	8,751
Guelph, University of	97	100	121	117	435
Montreal, University of	74	76	73	70	293
Saskatchewan, University of	71	71	67	67	276
University of Prince Edward Island	49	50	0	0	99
Total Enrollment—Canadian Colleges	291	297	261	254	1,103
Total Enrollment—US and Canadian Colleges	2,498	2,490	2,443	2,423	9,854

*Oregon State University veterinary students spend their second year and part of their third year at Washington State University. Therefore, Oregon State's 35 second-year and 36 third-year students are included in Washington State's figures.

TABLE 4—Geographic Distribution of Entering Class of Veterinary Students in US Colleges

Residence	Universities																												
	Auburn	California	Colorado	Cornell	Florida	Georgia	Illinois	Iowa	Kansas	Louisiana	Michigan	Minnesota	Mississippi	Missouri	North Carolina	Ohio	Oklahoma	Oregon	Pennsylvania	Purdue	Tennessee	Texas A&M	Tufts	Tuskegee	Virginia Tech	Washington	Wisconsin	Total
Alabama	47																				1			8				56
Alaska			2															3			1					2		8
Arizona			14					1	1								14	1								1		18
Arkansas							1	1		17			2	3										2				26
California	3	120			1	1		1	1		2	1				2	1		1	2			2	7		2		147
Colorado			60		1				2				1															64
Connecticut	1			2			1					3	1						2	1			9					20
Delaware												1							2									3
District of Columbia											1																	1
Florida				1	75				2										1	1	2		1	1				84
Georgia						54							1						1					5				61
Hawaii			4								2			1		2					1					1		11
Idaho																										10		10
Illinois				1			75					1	1											1			1	80
Indiana																				40	1							41
Iowa								76	1																			77
Kansas									54																			54
Kentucky	35					1		1					1	2		2				1	1			2				46
Louisiana										45																		45
Maine				1								1							1				3				1	7
Maryland				5					1			1				6			5		1			2	30			51
Massachusetts			1	1	1				2		1				2	1	1		1	1	1		39					52
Michigan							1				81																	82
Minnesota												35															1	36
Mississippi													28											2				30
Missouri					1			1						59														61
Montana			9														1	1								1		12
Nebraska								1	23			1		2		1												28
Nevada			3			1								1		3											1	9
New Hampshire												1				3				1			3					8
New Jersey	1			7			1	1			1		1	1		4			15	2	1		3	2			1	41
New Mexico		2	14															1								1		18
New York	1			60					1		5	7	3			1	1		4	5	6		4	4		3		105
North Carolina															67													67
North Dakota			1					7	2																			10
Ohio							1				1					93								1				96
Oklahoma																	65											65
Oregon								1				1	1					28										30
Pennsylvania	1							1	1		2	5	1		1	1			73	4	3		1	2			2	98
Puerto Rico				1	1			4	1	1	2					1				2				4				17
Rhode Island						1											1		1				1					4
South Carolina						13									1									4				18
South Dakota								1	2			3																6
Tennessee	2												2								41			1				46
Texas													1				1					127		1		1		131
Utah			9															2										11
Vermont				2															2				1					5
Virginia	1														1										50			52
Washington											1					1								2		37	1	42
West Virginia						9							1			7								1				18
Wisconsin								1			1	3															75	80
Wyoming			7						2																	1		10
Anguilla																								1				1
Canada																								1		1		2
Ghana																								2				2
Israel																										1		1
Jamaica																								2				2
Trinidad																								1				1
Total	92	122	124	81	80	80	80	98	96	63	100	64	44	69	72	128	71	36	109	60	60	127	67	59	80	60	85	2,207

Economic Note

Food animal veterinarians' service and product revenues, 1985

A national survey of food animal veterinarians was conducted in conjunction with the recent AVMA study on the US market for food animal veterinary medical services.[1,2] In part, the purpose was to secure data on veterinary medical service and product revenues.

The sample of food animal veterinarians was selected from the active membership of the AVMA. At the time of survey, 9,624 veterinarians were classified according to the following categories: large animal exclusive, including bovine and porcine exclusive and large animal—all species (1,587); large animal predominant, including mixed practice—predominantly large animal (4,709); and mixed animal, including mixed practice—50% small and 50% large animal (3,328).

Table 1 gives the distribution of the population of food animal veterinarians according to sex, age, and regional location for each type of practice. About 90% of food animal veterinarians are men; 43% are ≤39 years old. Nearly half (45%) are located in the north central region of the United States.

A stratified disproportionate random sample was developed by selecting 1,000 veterinarians from each of the 3 AVMA practice categories, on an every nth name basis.

The questionnaire was designed to gather information and opinions from veterinarians regarding their "primary livestock practice." This was defined for the respondents as the livestock group (ie, beef, dairy, swine, or sheep) from which they received the largest percentage of their revenue. This strategy was used in part because it was believed that respondents would be best able to provide information about the type of livestock client they served most frequently. Using this approach, it was possible to classify respondents and to develop meaningful results for specific types of livestock practice.

Conducted under the auspices of the AVMA, the survey yielded a total of 935 usable responses to the questionnaire. When categorized according to their "primary" type of livestock client, the response sample was distributed as follows: beef veterinarians (398), dairy veterinarians (437), swine veterinarians (91), and sheep veterinarians (9).

Responding practitioners reported their 1985 gross revenues for each of 3 areas of their practice: livestock products and services, horse products and services, and pet and miscellaneous products and services. Table 2 gives 1985 median gross revenue

Table 1—Distribution of population of food animal veterinarians, 1986

	Large animal exclusive	Large animal predominant	Mixed animal	Total food animal veterinarians
Total population	1,587	4,709	3,328	9,624
Sex distribution (%)				
Male	93	93	84	90
Female	7	7	16	10
Age distribution (%)				
Less than 30	9	10	17	12
30 to 39	44	40	45	43
40 to 49	23	21	19	20
50 to 59	14	17	11	15
60 to 75	10	12	8	10
Regional distribution (%)				
New England	4	1	4	3
Middle Atlantic	11	6	7	7
South Atlantic	9	5	12	8
East south central	4	5	11	7
East north central	21	23	16	20
West north central	19	36	13	25
West south central	8	11	18	13
Mountain	9	9	9	9
Pacific	15	4	10	8

Table 2—1985 Median gross revenue of food animal practitioners, by type of revenue

	Primary practice type			
Type of revenue	Beef (n = 326)	Dairy (n = 353)	Swine (n = 84)	Sheep (n = 7)
Livestock products and services	$50,544	$70,070	$96,405	$11,111
(%)	(52)	(70)	(76)	(7)
Horse products and services	$12,636	$6,470	$6,060	$63,703
(%)	(13)	(7)	(5)	(42)
Pet + miscellaneous products and services	$34,020	$23,460	$23,550	$77,216
(%)	(35)	(23)	(19)	(51)
Total	$97,200	$100,000	$126,015	$152,030
(%)	(100)	(100)	(100)	(100)

Prepared by J. Karl Wise, PhD, Wisemark Associates, PO Box 681189, Schaumburg, IL 60168-1189.

Table 3—1985 gross revenue of food animal veterinarians, by livestock type

Livestock type	Primary practice type			
	Beef	Dairy	Swine	Sheep
Beef	$38,413	$7,708	$22,173	$2,778
(%)	(76)*	(11)	(23)	(25)
Dairy	$6,065	$56,757	$12,532	$1,333
(%)	(12)	(81)	(13)	(12)
Swine	$4,549	$4,204	$57,843	$2,111
(%)	(9)	(6)	(60)	(19)
Sheep	$1,516	$1,401	$3,856	$4,889
(%)	(3)	(2)	(4)	(44)
Total	$50,544	$70,070	$96,405	$11,111
(%)	(100)	(100)	(100)	(100)

*Dollar revenue estimates are based on weighted average percentages of livestock revenue in parentheses.

Table 4—1985 gross revenue of food animal practitioners, by type of revenue

Type of revenue	Primary practice type			
	Beef	Dairy	Swine	Sheep
Professional services	$23,816	$39,162	$23,137	$3,422
(%)	(62)	(69)	(40)	(70)
Product sales	$14,597	$17,595	$34,706	$1,467
(%)	(38)	(31)	(60)	(30)
Total	$38,413	$56,757	$57,843	$4,889
(%)	(100)	(100)	(100)	(100)

for each primary livestock practice.

For those respondents whose primary livestock practice was beef cattle, only 52% of their gross revenue was attributable to livestock veterinary product sales and services. For primarily dairy and swine practitioners, livestock work accounted for 70% and 76% of their revenues, respectively. Only 7% of the revenue of the responding sheep practitioners was attributable to livestock practice. Small animal practice revenue as a proportion of total revenue ranged from 19% for 84 swine veterinarians to 51% for 7 sheep veterinarians.

Table 3 gives veterinarians' median livestock revenues according to type of livestock: beef, dairy, swine, and sheep. For example, the median livestock revenue for the dairy practitioners was $70,070: $7,708 from beef practice, $56,757 from dairy practice, $4,204 from swine practice, and $1,401 from sheep practice. The dollar figures in Table 3 are based on weighted average percentages of livestock revenue applied to the total dollar revenues from livestock practice. Thus, the estimated livestock revenues represent a composite food animal practitioner in each primary livestock area.

Further analysis of respondents' revenues showed how incomes of food animal practitioners are divided between professional services and product sales. Table 4 shows that 62% of beef revenue, 69% of dairy revenue, 70% of sheep revenue, and only 40% of swine revenue is attributable to professional services. Conversely, for swine practitioners, 60% ($34,706) of their median revenue ($57,843) was from sales of veterinary products.

Across all primary livestock practice areas, the average income of food animal veterinarians is composed of 62% professional services and 38% product sales.

Regarding only professional services, Table 5 gives food animal veterinarians' incomes according to sick animal services, well animal services, and consultative services.

Sick animal service revenue, as a percentage of total professional service revenue, ranged from 41% for swine practitioners to 63% for sheep practitioners. Sick animal service revenues for beef and dairy practitioners were 44% and 46%, respectively. Most of the sick animal service revenue (55 to 67%) was from farm call/consultation. With the exception of swine practice, surgery represented 19 to 21% of sick animal service revenue.

Well animal services, including farm call/consultation, vaccinations, and herd/reproductive work, ranged from 32% for sheep practice to 49% for beef practice. Vaccinations accounted for the most revenue in beef, swine, and sheep practices; herd/reproduction work accounted for the larg-

Table 5—Distribution of 1985 gross revenue of food animal veterinarians, by type of professional service

Type of service	Primary practice type			
	Beef (n = 330)	Dairy (n = 377)	Swine (n = 82)	Sheep (n = 7)
Sick animal	44%*	46%	41%	63%
Farm call/consultation	60%	65%	66%	55%
Surgery	21	18	8	19
Laboratory/diagnostic	11	8	16	23
Other	8	9	10	3
	100%	100%	100%	100%
Well animal	49%	43%	35%	32%
Farm call/consultation	21%	17%	35%	39%
Vaccination	40	23	44	42
Herd/reprod. work	33	56	16	18
Other	6	4	5	1
	100%	100%	100%	100%
Consultative	7%	11%	24%	5%
Herd health	67%	70%	56%	54%
Nutrition	14	16	22	29
Production	19	14	22	17
	100%	100%	100%	100%
Total	100%	100%	100%	100%

*Weighted average percentages.

Table 6—1985 gross revenue of food animal veterinarians, by type of product

Type of product	Primary practice type			
	Beef (%)	Dairy (%)	Swine (%)	Sheep (%)
Medications (eg, drugs, implants)	41*	59	36	44
Biologicals	33	26	39	29
Parasite control products	23	10	10	26
Feed additives	2	2	9	1
Livestock handling supplies	1	2	3	...
Other	...	1	3	...

*Weighted average percentages.

est proportion of well animal revenue for dairy practitioners.

Regarding consultative services, swine practitioners, on average, attributed 24% of their revenue to that type of service, with 55% of revenue attributable to herd health services, 22% to nutrition, and 22% to production. For beef and dairy practitioners, consultative services accounted for 7% and 11%, respectively, of total revenue; 67 to 70% represented herd health services.

In general, these data show that swine practitioners are more involved in consultative herd health services and less involved in sick animal services, compared with other types of practitioners. Beef practitioners, while not deriving a high percentage of their income from consultative services, do derive the highest percentage of income of all practitioners from well animal services, particularly vaccination and herd/reproductive work. Dairy practitioners are slightly more involved in sick animal services and consultative services than are beef practitioners.

Responses from sheep practitioners suggest that most of their revenue comes from sick animal services, with a relatively high proportion of that revenue from laboratory/diagnostic services. This situation may be associated with the notion that the sheep practitioners in the sample have substantial pet and equine practices and serve the sheep sector only because the local livestock practitioners tend to concentrate on the beef, dairy, and swine sectors. Results of a national survey of sheep producers suggested that local veterinarians were not very important to the sheep operation, and that food animal veterinarians did not know a great deal about sheep production and sheep health.[3,4] Results from the survey of veterinarians appear to support that notion.

Regarding veterinarians' product sales, Table 6 shows that the largest percentage of product sales for dairy practitioners is medications (59%), followed by biologicals (26%). For beef and sheep practitioners, medications are 41% and 44% of product sales, respectively; biologicals are 33% and 29% of product sales, respectively. Swine practitioners' product sales show less medications (36%) and more biologicals (39%) and feed additives (9%) than do the sales of other practitioners.

1. Wise JK. US market for food animal veterinary medical services. *J Am Vet Med Assoc* 1987;190:1530–1533.

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3. Wise JK. Livestock producers' attitudes about food animal veterinarians. *J Am Vet Med Assoc* 1988;192:543–544.

4. Wise JK. Livestock producers' ratings of alternative veterinary information sources. *J Am Vet Med Assoc* 1988;192:808–810.

Correction: Serial determination of thyroxine concentrations in hyperthyroid cats

In the article, "Serial determination of thyroxine concentrations in hyperthyroid cats" (JAVMA, Jan 1, 1988, pp 49–51), the last sentence in the first full paragraph on p 50 should read "100 μCi of ^{131}I," not "100 mCi of ^{131}I."

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VBPA

A survey on the question of how well veterinarians are prepared to predict their client's human-animal bond

Thomas E. Catanzaro, DVM, MHA

Summary: In a survey of 63 military veterinary facilities, actual responses from 961 clients were compared with 86 servicing US Army Veterinary Corps practitioners' predictions of the clients' responses. The survey questions were designed to evaluate the degree of human-animal bonding of the military clients. The survey revealed that the effects of human-animal interaction on community, family, and animal health have extensive impact on the military member, the military installation, and the military health care delivery system. Results revealed sociologic and psychologic factors that influenced the quality of life of mobile military members and their families. The survey also revealed that although the newly graduated veterinarians understood the professional and scientific values of their clients, they often underestimated the social interdependence between client and pet. The military veterinarians in this survey were considered to be representative of the new graduate, and the results are relevant to any civilian practitioner concerned with client relations or hiring new graduates.

To properly analyze the opinions of the mobile military population on human-animal bond factors, a survey was developed to evaluate 5 factors: a cross section of American pet owners, the mobile military family group, the pet's role in the quality of life of service members, the pet's role in community health, and the newly commissioned veterinarian's perception of the human-animal bond in the family group.[1]

The primary goal of the study reported here was to identify the benefits of companion animals for pet owners. This comparison between client responses and veterinarian's predictions of those responses was laterally completed by the attending veterinarians in hopes of providing information that might increase the sensitivity of educators and veterinarians to the importance of the human-animal bond in client relations.

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Materials and methods

Base-line concepts were developed from a 62-family survey.[a] Survey questions were developed from the subjective responses to that family survey, then the questions were expanded on the basis of professional health care experience of the military veterinarians, social workers, and psychiatry officers at the US Army Health Services Command. The questionnaire was refined into a 32-question, computer-ready format. To initiate the survey, 1,500 copies of the military human-animal bond survey were distributed to 63 military installations; 961 client surveys were returned (64%). Also, it was requested that the supporting military veterinarian complete a survey and attempt to predict the average client response; estimates were received from 86 veterinarians (50.2%). The distribution of the client survey was conducted so that every person who walked through the door on a given morning was handed a survey and asked to complete it to the best of their ability.

The typical military veterinary facility (referred to as an Animal Disease Prevention and Control Facility) operates by appointment only, for approximately 12 to 16 composite hours during a week. The veterinarian usually is a new graduate, with the values, attitudes, and skills that have accumulated after 4 years of veterinary medical education. During the remainder of duty time (30 or more hours/week), the military veterinarian is scheduled to do community public health activities, such as sanitary inspections, zoonotic disease surveillance, hospital committee attendance, or supervision of enlisted personnel who do food inspection.

Most veterinary facilities on military installations are permitted only to conduct diagnostic procedures until the causative agent is identified. If a zoonotic or economically important disease is identified, or if an organism that causes the spread of a potentially zoonotic organism is suspected and the acute condition can be readily cured, the veterinarian may treat the animal; however, if a nonzoo-

[a]Cain AO. A study of pets in the family system. Presented at the First International Conference on the Human/Companion Animal Bond, 1981.

notic condition is diagnosed, or if treatment would require long-term care, it is requested that the facility refer the case. For these diagnostic and vaccination services, the average client pays $12 to $18/visit.

The art of veterinary medicine has been defined in many ways, but for the sake of this discussion, it will be defined as the veterinarian's ability to detect the client's bond with his or her pet, and how that bond may influence the decision process on patient care.

Survey technique—Respondents were asked to place an X on a line below the words always, usually, sometimes, or never that most usually represented their feelings. This format was used throughout the survey to better identify the trends. Accuracy was increased by dividing the line into at least 10 segments when quantifying the responses for computer tabulation. Exceptional ratings were required to be on the left or right 20% of the line; responses marked on the center 60% were considered neutral.

Results

The respondents in the owner survey population consisted of 34.2% husbands, 52.9% wives, and 12.9% other, and ranged in age from 19 to 71 years. The veterinarians responding were predominantly male (83%), and had graduated from veterinary school not more than 3 years before the survey. The sample sizes were considered adequate to compensate for particular practice irregularities or great variances in responses. The clients reported that 77.4% visit their veterinarians 2 or more times/year/pet (compared with 70.9%, as estimated by the veterinarians); 59.8% were exceptionally satisfied with the veterinary services (veterinarians thought only 23.2% would be exceptionally satisfied); 34.4% usually celebrated the pet's birthday (veterinarians predicted 17.4%); 53.1% displayed pictures of their pet at home (compared with 44.2%, as estimated by the veterinarians); and 50.4% stated that their pet was extremely important to their family (the veterinarians predicted only 26.7% would rate pets this high on the importance scale).

Questions that attempted to quantify the reasons why an animal is less important to some persons were included. Housing limitations were ranked by clients and veterinarians as the most frequent reason for not owning a pet. Inconvenience was ranked second by both. The clients' third reason was that too much time was required for care; veterinarians rated this reason 8 on a scale of 10. Undesirable behavior was ranked tenth by the clients; veterinarians estimated this would be ranked sixth.

The veterinarians predicted that 23.8% of the clients spent $100 or more/year/pet for other than food, but 37.8% of the clients reported that they spent $100 or more. The veterinarian and client responses agreed on what children gained from having a pet, in order of most to least important: learn responsibility, companionship, pleasure, respect for life, gentleness, and education in life processes.

Table 1—Changes in family interaction with the introduction of a pet

Family factor	Increase (%)		Decrease (%)	
	Clients' response	Veterinarians' prediction	Clients' response	Veterinarians' prediction
Arguing	8.0	12.8	9.2	9.3
Affection expressed around pet	59.3	54.7	0.7	0
Travel and freedom	6.8	1.2	39.3	55.8
Happiness and fun	70.1	65.1	1.4	0
Responsibility	63.5	68.6	0.7	0
Time together as family (with pet)	51.7	44.8	1.3	2.3

Table 2—Expected problems associated with pet ownership

Problem area	More than expected (%)		Less than expected (%)	
	Clients' response	Veterinarians' prediction	Clients' response	Veterinarians' prediction
Housebreaking	15.1	36.0	31.5	15.1
Disciplining	17.8	32.6	27.0	12.8
Feeding	6.4	9.3	23.7	15.1
Behavior with family	10.6	17.4	22.2	18.6
Location or territory	11.9	29.1	19.7	10.5
Grooming	18.1	30.2	17.1	12.8
Cleaning	14.5	27.9	18.7	10.5

Table 3—Reasons for clients selecting a civilian veterinarian

Reason	Clients' response	Veterinarians' prediction
Range or scope of services	1	1
Professional skills of veterinarian	2	6
Availability of after-hours service	3	2
Convenience to residence	4	3
Appointment hours	5	4
Personality of veterinarian	6	5
Telephone assistance	7	9
Cost of services	8	11
Personality of staff	9	7
Veterinary specialists on staff	10	10
Facility appearance	11	8
House call services availability	12	14
Knowledge of unique problems	13	13
Parking	14	12

In evaluating the changes associated with bringing a pet into a household, the survey addressed family interaction changes. The factors and changes are given in Table 1. A closer comparison was expected when discussing potential animal problem areas; however, this was not the case (Table 2).

To evaluate why certain people used certain veterinarians, 14 reasons were provided, and respondents were asked to rank them in order of importance (Table 3), with 1 being the most important and 14 being the least important reason. Veterinarians predicted accurately the reasons for selection of a practice, but their estimates of the importance of a pet diverged largely from the responses of the clients. When clients were asked to evaluate how important their pet was to their family, 50.3% reported extremely important, 33.8% reported very important, and 12.4% reported important; veterinarians predicted approximately half this response rate. To better evaluate the importance of

Table 4—Evaluation of the importance of the pet in specific situations

Situation	Great importance (%)		No importance (%)	
	Clients' response	Veterinarians' prediction	Clients' response	Veterinarians' prediction
At all times	75.4	46.5	1.7	1.2
Temporary absence of spouse	73.2	58.1	6.7	2.3
Free time or relaxation	71.4	46.5	2.8	1.2
Childhood period	69.8	66.3	9.7	2.3
Sad, lonely, depressed	68.4	67.4	5.1	3.5
Marriage without children	58.6	47.7	25.5	15.1
Temporary absence of children	53.3	32.6	17.5	14.0
During illness or after other's death	52.1	44.2	14.0	7.0
During crisis or separation or divorce	50.4	45.3	16.4	8.1
During moves or relocations	48.2	23.3	17.6	15.1
Teenage period	44.5	27.9	16.1	9.3
Unemployment	35.7	23.3	31.4	24.4

The percentages on each line are of the total population, and show those that recorded their X on the right or left 20% of the answer line; the percentage unaccounted for was in the center 60%, considered neutral for this study.

the companion animal, the line scale was used for 12 specific situations (Table 4).

In addition to questions concerning the importance of the pet to the family, other questions were posed to evaluate the anthropomorphic tendencies of the respondents. When asked how the companion animal fit into the family, 68.3% of the clients stated that the pet had full family member status, whereas only 38.4% of the veterinarians predicted this degree of bonding. Later in the survey, the questions were rephrased, and the client was asked whether the pet was afforded people status in the family. The line scale was used and the respondent was asked to rate the status from always to usually and from sometimes to never. Results showed 38.8% of the clients believed their pet was always afforded people status (veterinarians predicted 16.3%), 71.7% believed their pets were usually to always afforded people status (veterinarians predicted 52.3%), and 3% of the clients reported that their pet was never afforded people status (the veterinarians predicted 8.1%).

Many traits or attributes are credited to the companion animal during daily conversations, so the survey asked specifically what special characteristics the pet displayed. The responses were placed on the line scale (Table 5).

In evaluating the responsiveness of the pet, clients reported the pet displayed usually quick positive responses 86% of the time for parents and 48% of the time for children, whereas the veterinarians estimated 89% for parents and 62% for children. To consider negative interactions, the question was rephrased and the respondents reported the pet displayed usually quick negative responses 23% of the time for parents and 25% of the time for children. The veterinarians estimated that usually quick negative responses toward parents and children would be 30 and 29%, respectively. Respondents reported that about half the pets never showed a quick negative response to adults, whereas the veterinarians estimated that only one third would never show a quick negative response. Clients reported that less than 1% of the pets never showed a quick positive response, and veterinarians agreed by estimating that all pets would show a quick positive response at some time.

A question was posed concerning the pet's response when family members showed affection toward each other. The clients reported that 78.7% of the pets wanted active involvement (veterinarians estimated 68.6%), whereas 6.8% of the pets never responded (veterinarians estimated 9.3% would never respond). When asked about the pet's response during times of high anxiety or crisis in the family, 59.2% of the owners reported that their pet usually wanted interaction with the family, whereas the veterinarians estimated only 37.2% would want interaction. In regard to the companion animal's response to a new addition in the family group, 38.3% of the family animals showed positive behavior changes, 16.3% showed negative behavior changes, and 45.4% showed no change. The veterinarians predicted that only 15.1% would show

Table 5—Reported special characteristics shown by companion animals

Characteristic	Great display of trait (%)		No display of trait (%)	
	Clients' response	Veterinarians' prediction	Clients' response	Veterinarians' prediction
Greets you upon coming home	89.4	82.6	1.5	1.2
Pet understands when you talk to him/her	77.0	58.1	0.9	1.2
Communicates to you	73.0	60.5	1.4	3.5
Demand for attention	59.6	51.2	2.3	3.5
Understands or is sensitive to your moods	59.3	48.8	4.2	5.6
Stays close when you are anxious or upset	49.7	27.9	10.7	18.6
Sleeps with family member	44.9	31.4	34.8	37.2
Mimics your emotions	22.6	20.9	23.4	30.2
Hides or withdraws when you are anxious or upset	11.8	16.3	56.3	38.4
Expresses feelings that you cannot or do not	10.6	10.5	58.6	41.9
Develops illness when family tension is high	3.9	7.0	84.3	70.0

The percentages on each line are of the total population, and show those that recorded their X on the right or left 20% of the answer line; the percentage unaccounted for was in the center 60%, considered neutral for this study.

positive change, 12.8% would show a negative change, and 72.1% would show no change in behavior.

The pet's role as a third party in arguments or in stress relief was surveyed by the question, "When tension between 2 persons exceeds a certain level, it has been noted that a third party is brought into the discussion to dissipate the intensity of the tension; does this occur with your pet becoming that third party?" The survey revealed that 8.2% of the respondents said the pet was always the third party involved, 43.8% reported that it occurred sometimes to always, and 38.4% reported that it never occurred. The veterinarians estimated it would always occur in 2.5% of the cases, it would occur sometimes to always in 46.9%, and it would never occur in 28.4%.

With the highly mobile life-style seen in today's workplace, the survey asked what would happen to the pet at times of family relocations or household moves. The scope of choices and responses are given in Table 6. To further evaluate the strength of the family/pet bond, respondents were asked what they would do if their pet became seriously ill; results are given in Table 7.

Table 6—Expected disposition of animal when family relocates

Action	Move within country (%)		Move overseas (%)	
	Clients' response	Veterinarians' prediction	Clients' response	Veterinarians' prediction
Take with you to new home	65.4	82.9	35.6	20.0
Ship to new home	13.3	11.8	46.8	49.2
Give away	5.2	3.9	8.9	20.0
Turn-in for adoption	1.5	1.3	2.8	9.2
Give to humane society	1.6	...	1.4	1.5
Sell	1.1	...	1.4	...
Turn in for veterinary disposal	1.1	...	1.0	...
Release to farm or woodland	1.0	...	0.7	...
Abandon	0.9	...	0.8	...

Table 7—Expected client action when pet becomes seriously ill

Situational response	Clients response (%)	Veterinarians' prediction (%)
Do whatever the military veterinarian recommended	41.2	29.9
Do whatever was needed if pet could be returned to normal health	19.8	13.4
Do whatever was needed for disabled pet as long as no pain or suffering	18.1	11.8
Do whatever the civilian veterinarian recommended	10.6	15.3
Have pet euthanatized if treatment costs more than $200 to $250	6.0	18.1
Have pet euthanatized before treatment costs any more	1.8	6.7
Let nature take its course	1.3	1.9
Replace ailing pet with healthy pet	0.3	3.5

Respondents were asked if they had ever had a pet that was lost, that had died, or that had been killed and to describe the degree of loss felt by the family. Almost all clients (94.4%) reported important to extreme loss, and 58.8% of those said it was an extreme loss; only 0.1% of the clients reported no loss was felt. Whereas the veterinarians' estimates for important to extreme loss approximated the clients (93.8%), they said only 27.2% would feel extreme loss; also, the veterinarians estimated that no client would report no loss was felt. Another question was asked dealing with the disposition of the deceased companion animal; the results are given in Table 8. Almost 70% of the clients wished to bury their animal.

Table 8—Preferred companion animal remains disposition methods

Disposition action	Clients response (%)	Veterinarians' prediction (%)
Bury in marked grave, but not in pet cemetery	42.6	34.6
Take to veterinarian or humane society for disposal	28.3	27.2
Bury, but not anywhere special	14.8	27.1
Bury with full ceremony in pet cemetery	12.8	6.2
Let someone else dispose of pet	1.6	1.2
Dispose of by standard waste removal services	0.7	3.7

Discussion

The proximity of the Animal Disease Prevention and Control Facility enhances the choice of military clients to use the military veterinarian. Although the client pays for all goods received, there is a perception of true value, because high profit should not be a motive of the military facility operations. The facility operates to protect the health of the soldier and the public health of the federal community surrounding the military working/training environment; the clients accept the restricted (by appointment only, refer if chronic) veterinary medical service support program as necessary for typical military readiness and mobilization.

Conversely, a newly graduated military veterinarian and a newly graduated civilian-salaried veterinarian are expected to have similar value profiles.[2] A new graduate brings only knowledge learned in school and a small amount of personal experience learned from another veterinarian. A new veterinarian enters an established practice with established rules, procedures, and techniques for handling clients; the new practitioner must comply with the practice standards already established. A recent graduate generally requires close supervision and development in areas of client relations.

The differences in veterinarian prediction and client response (Table 1) were attributed to the youth of the military veterinarians, especially in reference to their family experiences. It was thought that Table 2 would show better predictions, but the

number of owners with the response of less than expected was high.

The veterinarians generally predicted negative responses about pet and family interactions that were not reported by clients. The clients reported that less than 1% of the pets never showed a quick positive response, and the veterinarians predicted that clients would believe that all animals have some good in them. The figures in Table 7 reflect a responsible pet ownership being supported by veterinarians.

Emotional stress developed when a pet was lost, had died, or was killed. Table 8 was designed to compare client values with common practice methods. In theory, clients and veterinarians were equally sensitive to the need for burial.

Results of the survey implied that military pet owners have more intense human-animal bond feelings than other groups in similar surveys.[3,4] It appeared that the economic, educational, and social structure of the military respondents were the key factors affecting results of the survey. In this survey population, 54% were mothers, less than 34% had a college education, and most earned less than $20,000/year. In comparable studies, the respondents in the surveyed population were better educated, included more females, or had a higher economic status.

By identifying the center 60% of the response line as neutral, the intensity of the clients' emotions could be better identified; this also caused the responding veterinarians to appear less perceptive. The veterinarians estimated the clients effectively in matters of professional or scientific judgment, but appeared to underestimate the intensity of the social interdependence between animals and human beings. If the negative responses were evaluated for the same answer line, it would be noted that the veterinarians generally overestimated the response; that is, they could not imagine clients that could not see the value of a companion animal. Veterinarians' responses often were on the center 60% of the answer line, thereby masking their mediated responses.[5] When educational trends are observed,[6,7] it can be seen that universities are aware of the need to teach ethics and values, as is the American Veterinary Medical Association. But when these ethics are applied, the new graduate appears to mediate his response from his personal intense belief. From management experiences, this response could be credited to a new employee syndrome, common to the military or to civilian practice; that is, what will the boss tolerate?

The importance of the companion animal to the family appeared to be substantially greater in this survey population, compared with populations considered in other surveys. However, the responses concerning companion animals in family situations were similar in most populations. The low estimates by the veterinarians might be indicative of a lack of experience or of memories of a few bad experiences in the first few years of practice. Regardless of cause, the importance of the human-animal bond in client relations must be realized, and sensitivities should be increased in academic and practice environments.

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VBPA

Sources of federal employment opportunities for veterinarians

Edward L. Menning, DVM, MPH

To apply to get on the federal register for the Veterinary Medical Science Series, GS 701, which includes all traditional veterinary positions such as meat/poultry inspection, pathology, brucellosis/tuberculosis control, animal welfare, and animal drug and biologics control, veterinarians should apply to the following office, which handles all federal civilian veterinary job opportunities:

US Department of Agriculture
Food Safety and Inspection Service (FSIS)
Personnel Operations Branch-Special Examining Unit
Butler Square West
100 N Sixth St
Minneapolis, MN 55403
(612) 370-2064

This application costs nothing and makes you available for hire more rapidly.

A veterinarian <1 year out of school with no specialized training may be offered GS-9 positions ($22,907/year for 1988). Any veterinarian ≥1 year out of school is eligible for GS-11 positions ($27,716/year for 1988). With specialized training and experience, higher level positions would be offered (Table 1).

When completing your application forms to be placed on the federal register, be sure you do not limit your list of experiences and education only to medical/technical areas. Federal agencies will be needing many of your talents in management, supervision, writing, problem solving, and speaking. You should stress courses or experiences you have had in these areas, in addition to your medical expertise.

If you want a federal job, you should consider accepting the most desirable one available, even though it may not be your ideal. By "getting into the system," many other federal positions will be available to you. Federal jobs generally are advertised in 4 categories: (1) only employees of the agency concerned, such as meat/poultry inspection, may apply, (2) only employees of the department, such as USDA, may apply, (3) all government-wide veterinarians may apply, or (4) veterinarians from all sources may apply. Over 75% of all jobs open are in categories 1, 2, and 3. Category 4 is the only category for which veterinarians who are not presently employed by the federal government may apply. Once employed, at least category 3 would be open to you and, depending on the agency you are with, all may be open to you (Table 2).

Following are addresses and phone numbers for most individual federal agency employment offices. Where available, a contact who is knowledgeable about jobs of interest to veterinarians is listed.

Table 1—New pay schedule (dollars/yr) for classified (GS) employees effective January 1988

	Steps									
GS	1	2	3	4	5	6	7	8	9	10
1	9,811	10,139	10,465	10,791	11,117	11,309	11,631	11,955	11,970	12,275
2	11,032	11,294	11,659	11,970	12,103	12,459	12,815	13,171	13,527	13,883
3	12,038	12,439	12,840	13,241	13,642	14,043	14,444	14,845	15,246	15,647
4	13,513	13,963	14,413	14,863	15,313	15,763	16,213	16,663	17,113	17,563
5	15,118	15,622	16,126	16,630	17,134	17,638	18,142	18,646	19,150	19,654
6	16,851	17,413	17,975	18,537	19,099	19,661	20,223	20,785	21,347	21,909
7	18,726	19,350	19,974	20,598	21,222	21,846	22,470	23,094	23,718	24,342
8	20,739	21,430	22,121	22,812	23,503	24,194	24,885	25,576	26,267	26,958
9	22,907	23,671	24,435	25,199	25,963	26,727	27,491	28,255	29,019	29,783
10	25,226	26,067	26,908	27,749	28,590	29,431	30,272	31,113	31,954	32,795
11	27,716	28,640	29,564	30,488	31,412	32,336	33,260	34,184	35,108	36,032
12	33,218	34,325	35,432	36,539	37,646	38,753	39,860	40,967	42,074	43,181
13	39,501	40,818	42,135	43,452	44,769	46,086	47,403	48,720	50,037	51,354
14	46,679	48,235	49,791	51,347	52,903	54,459	56,015	57,571	59,127	60,683
15	54,907	56,737	58,567	60,397	62,227	64,057	65,887	67,717	69,547	71,377
16	64,397	66,544	68,691	70,838	72,500	73,660*	75,765*	77,870*	79,975*	
17	73,958*	76,423*	78,888*	81,353*	83,818*					
18	86,682*									

*The rate of basic pay payable to employees at these rates is limited to the rate for level V of the Executive Schedule, which is $72,500.

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US Department of Agriculture

Food Safety and Inspection Service (FSIS)
Personnel Operations Branch
Butler Square West
100 N Sixth St
Minneapolis, MN 55403
(612) 370-2024

The FSIS involves mainly meat/poultry inspection but some science and administrative positions are available.

Animal and Plant Health Inspection Service (APHIS)
Field Servicing Office
Butler Square West
100 N Sixth St
Minneapolis, MN 55403
(612) 370-2182

The APHIS involves mainly animal disease control and animal welfare, but some research, science, and administrative positions are available.

Agriculture Research Service (ARS)
Administration Operations Division (ACD)
Bldg 003-BARC West
Beltsville, MD 20705
(301) 344-2701
Vacancy recording
(301) 344-2288

In ARS, animal disease research positions are available.

Food and Drug Administration

Food and Drug Administration (FDA)
5600 Fishers Ln
Rockville, MD 20857
(301) 443-1970
Attn: Ms. Nancy Altman
Vacancy recording:
(301) 443-1969

Positions with the FDA involve evaluating animal drug efficacy, safety, and residues.

National Institutes of Health (NIH)

For strictly veterinary civil service:

US Department of Agriculture
Food Safety and Inspection Service (FSIS)
Personnel Operations Branch-Special Examining Unit
Butler Square West
100 N Sixth St
Minneapolis, MN 55403
(612) 370-2064

Table 2—Number of federally employed veterinarians in April 1988

Agency	Military rank (GS or GM grade) 0–1 (9)	0–2 (11)	0–3 (12)	0–4 (13)	0–5 (14)	0–6 (15)	0–7 (16–18) or SES	Total
USDA								
FSIS	14	222	720	232	45	16	12	1,261
APHIS	16	42	276	92	86	38	24	574
ARS	1	11	13	10	10	16	5	66
OICD					1			1
CSRS						1		1
ADC							1	1
Extension service (120 veterinarians, full-time equivalent of)								80
Total								1,984
Department of Health and Human Service (DHHS)								
FDA	1	5	5	33	21	13	5	83
NIH		4	8	16	17	27	1	73
CDC		4	4	8	6	10	1	33
HRSA						1		1
ADAMHA				1	1			2
EPA*					1	3	1	5
USUHS*						1		1
PAHO*						1		1
Total								199
Department of Defense (DOD)								
US Army								
Military		5	220	102	76	41	1	445
Civilian							1	1
US Air Force								
Military			34	36	32	24		126
Civilian				3	2		1	6
US Navy								
Civilian						2		2
Total								580
Department of Interior								
Fish and Wildlife Service		2	2	6	1			11
Department of Commerce								
National Marine Mammal Laboratory					1			1
National Marine Fish Service			1	1				2
Total								3
USAID						1		1
Veterans Administration			2	6	1	1		10
Smithsonian (Zoo)				1		2		3
US Senate							1	1
Total	**32**	**295**	**1,285**	**547**	**301**	**198**	**54**	**2,792**

GS = General schedule; GM = General merit; SES = Senior Executive Service; OICD = Office of Internal Cooperation and Development; CSRS = Cooperative State Research Service; ADC = Animal Damage Control; HRSA = Health Resources and Service Administration; ADAMHA = Alcohol, Drug Abuse, and Mental Health Administration; EPA = Environmental Protection Agency; PAHO = Pan American Health Organization.
*Agency not in DHHS but DHHS people assigned.

For all other biological sciences:

National Institutes of Health
Recruitment and Employee Benefits Branch, NIH
Bldg 31, Room B-3, C 15
Bethesda, MD 20892
(301) 496-2403
Vacancy recording:
(301) 496-1209

These are science, laboratory animal, research, and epidemiology positions.

For Commissioned Officers in Uniformed Services Public Health Service (USPHS):

Commissioned Personnel Operations
Parklawn Bldg, Room 4-35
5600 Fishers Ln
Rockville, MD 20857
(301) 443-3087

These positions are for Commissioned Officers and include mainly biomedical animal research and epidemiology.

Centers for Disease Control (CDC)

Centers for Disease Control
1600 Clifton Rd, NW
Atlanta, GA 30333

All veterinary positions are Commissioned Officer positions (see NIH address for Commissioned Officers).

For civil service positions in other biological sciences, you should contact:

Centers for Disease Control
Attn: Personnel Management Office
1600 Clifton Rd, NW
Atlanta, GA 30333
(404) 329-3615

These positions involve mainly in infectious disease, epidemiology, and science.

US Army Veterinary Corps

Veterinarians must contact a regional army medical recruiter for hire. For general veterinary hiring information, veterinarians can write or call the following:

USA TAPA
DAPC-OPH-VC
Hoffman II, Rm 9N57
200 Stovall St
Alexandria, VA 22332-0400
(703) 325-2360
Contact: Col. William B. Smith

For duty to country and supplemental income of several thousand dollars per year contact:

Army National Guard Bureau
Maj. Lee Burrows
HQDA (SGPF-PDM-M)
1900 Half St, SW
Washington, DC 20324-2000
(202) 475-0918 or (202) 465-1508

Army Reserves
Health Profession Support Agency (HPSA)
Attn: SGPS-PDB
511 Leesburg Pike
Falls Church, VA 22041-3258
(703) 756-8122

US Air Force Biomedical Science Corps

Positions for veterinarians only as Environmental Health Officers:

Chief Environmental Health
Headquarters USAF SGPA
Bolling AFB, DC 20332
(202) 767-1238
Contact: Col. Richard L. Shafer

For duty to country and supplemental income of several thousand dollars per year contact:

Air National Guard (ANG)
Capt. Thomas E. Rentz
ANGSC/MPRM Stop #18
Andrews AFB, MD 20331
(301) 981-6716

Air Force Reserve (AFRes)
Maj. Lee Murphy
ARPC/SGPH
Denver, CO 80280-5000
1-800-525-0102 (Ext 232)

US Department of Interior

US Department of Agriculture
Food Safety and Inspection Service (FSIS)
Personnel Operations Branch-Special Examining Unit
Butler Square West
100 N Sixth St
Minneapolis, MN 55403
(612) 370-2064
Contact: Dr. Louis Locke
(608) 271-4640

These are mainly fish and wildlife related positions.

US Agency for International Development (AID)

These food animal science related positions are overseas and are few in number. Your best bet is to call the listed offices for information:

African Bureau	(202) 647-8813
Asian Bureau	(202) 647-8262
Latin American/Caribbean Bureau	(202) 647-5680
Science/Technology Bureau	(202) 647-1827

US Department of Commerce

National Marine Mammal Laboratory and
National Marine Fisheries Service

These marine jobs are related to research or inspection of fish or research about marine mammals. These come under the National Oceanic and Atmospheric Administration (NOAA). For openings, contact the office in region(s) of interest.

NOAA, Western Administrative Support Center
Personnel Division, RAS/WC2
7600 Sand Point Way, NE
BIN C15700
Seattle, WA 98115-0070
(206) 526-6056

NOAA, Mountain Administrative Support Center
Personnel Division, RAS/MC2
325 Broadway
Boulder, CO 80303
(303) 497-6305

NOAA, Central Administrative Support Center
Personnel Division, RAS/CC2
Federal Bldg, Room 1740
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NOAA, Eastern Administrative Support Center
Personnel Division, RAS/EC2
253 Monticello Ave, Room 413
Norfolk, VA 23510
(804) 441-6516

Veterans Administration

Veterans Administration
Chief Veterinary Medical Officer
810 Vermont Ave, NW, Room 15E
Washington, DC 20420
Contact: Dr. Donald D. Holmes
(202) 223-5174

All of these positions are in laboratory animal medicine.

Other career fields

For career fields other than series 701 (Veterinary Medical Science) for which veterinarians may be eligible, such as wildlife biology, food technology, and

Table 3—Additional jobs for which veterinarians may be eligible by their training in basic science

GS series No.	Job title
018	Occupational Safety and Health (Biosafety Officer)
340	Program Management
401	General Biological Science
403	Microbiology
405	Pharmacology
410	Zoology
413	Physiology
440	Genetics
480	General Fish and Wildlife Administration
482	Fishery Biology
486	Wildlife Biology
487	Husbandry (Animal Scientist)
601	General Health Science (Epidemiology)
685	Public Health Program Specialist
696	Consumer Safety
1083	Technical Writing and Editing
1301	General Physical Science
1306	Health Physics
1382	Food Technology
1712	Educator/Teaching
1863	Food Inspector

physiology, you will have to contact a different area office to be placed on the register (Table 3).

When positions for the series in Table 3 are located in medical and public health federal agencies, veterinarians could often qualify, assuming experience and longevity also are met. Remember that different offices handle various of these series. The office that handles veterinary medical science (GS 701) cannot help you with general health science (GS 601), or vice versa.

Going to a different area personnel office is made more difficult because there is not a list of which office handles which career fields. Therefore, contact specific agencies and/or go to your state's US Employment Service (Federal Job Opportunities Office) where a computerized list of all federal vacancies is kept and from whom you can then request further information on where to apply for specific jobs.

Additional Source of Information

The following corporation has information available, for a fee, to assist anyone in finding and/or applying for federal jobs:

Federal Research Service, Inc (not a government agency)
PO Box 1059
Vienna, VA 22180-1059
(703) 281-0200

The following brochures may be purchased from the above:

Federal Career Opportunities—The job listing brings the vacancies to you. 3,400+ currently available federal jobs, nationwide and overseas; General Schedule (GS) grades 5 through Senior Executive Service (SES); updated and published every two weeks; organized by GS series within each agency; complete application mailing addresses, personal contacts and phone numbers when available; 64-page; bi-weekly.

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Veterinary Services Market for Companion Animals

Summary Report

In 1983, the AVMA sponsored a study on animal ownership and the use of veterinary services by US households.[1] Since that report, there has not been a comprehensive statistical assessment of the veterinary services market for companion animals. Therefore, the AVMA decided to sponsor a new study on companion animal ownership and use of veterinary services. The main objectives were to determine the number of dogs, cats, pet birds, and equine animals owned by US households in 1987, and how often these animals were examined by veterinarians, to estimate 1987 household expenditures for veterinary care, and to assess market trends from 1983 to 1987.

To achieve these objectives, a mail questionnaire was designed with questions regarding ownership of pets and horses, and number of times they were examined by a veterinarian in 1987. Other questions were included to identify household expenditures for veterinary services and products. In addition, households were asked if they had a veterinarian who they would normally call for veterinary health care, why they first chose this veterinarian, and how satisfied they were with the service received from their veterinarian. The questionnaire was mailed to a nationally representative sample of 40,000 US households in March 1988. The number returned was 29,535 (74%).

Companion animal ownership

Statistics on companion animal ownership (Table 1) show the percentage of households that owned each animal species, as well as the average number owned per household. At the end of 1987, more households owned a dog than a cat. However, the cat population exceeded the dog population because households owned more cats on average. In comparison, the percentages of households owning either pet birds or horses were smaller, and the respective populations thus were smaller.

When compared with the 1983 study on veterinary services, several important changes have occurred. For one, the percentage of households owning dogs has declined. In 1983, 42.5% of households owned a dog, versus 38.2% in 1987. However, the percentage of cat-owning households increased from 28.4% in 1983 to 30.5% in 1987. Therefore, cat ownership has grown in popularity, while dog ownership has declined. Horse ownership has remained relatively stable since 1983. For example, the percentage of households owning horses was 2.8% in 1983 and 1987. However, the average number of horses owned decreased from 3.0 to 2.6 horses, and this contributed to a slight decrease in the horse population. The percentage of bird-owning households increased from 5.0% to 5.7%.

Expenditures for and use of veterinary services

The total 1987 expenditures for companion animal veterinary care was an estimated $4,987,000,000. As shown in Table 2, over half of this was spent on dogs, and almost a third was spent on cats. Relatively less was spent on horses, pet birds, and other species of household pets. In the 1983 report on veterinary services, companion animal expenditures were estimated to be $3,796,000,000. Even though the 1983 and 1987

Table 1—Companion animal ownership and population estimates

	Dogs	Cats	Pet birds	Horses
Percentage of households owning animal on 12/31/87	38.2%	30.5%	5.7%	2.8%
Average number owned per household	1.5	2.0	2.5	2.6
Estimated population (million)	52.359	54.583	12.895	6.597

Table 2—Estimated 1987 expenditures for veterinary care of companion animals

Species	1987 Expenditures (billions)	% of total
Dogs	$3.012	60.4
Cats	1.573	31.5
Horses	0.330	6.6
Birds and other pets	0.072	1.5
Total	$4.987	

Prepared by C. Michael Troutman, PhD, Charles Charles Research Group, Overland Park, Kan. First in a series of 5 synopses from the entire report, which became available Sept 15 (see *JAVMA*, Oct 1, 1988, p 765).

Table 3—Percentages of households that obtained veterinary care, 1987 and 1983

Type of animal	1987 (%)	1983 (%)*
Dog	77.6	73.6
Cat	59.5	47.2
Pet bird	7.6	7.5
Horse	47.4	42.6

*In the 1983 study, households were asked about their use of veterinary services during the period May 1982 to May 1983.

expenditures are not statistically comparable, the results suggest a substantial increase in veterinary service expenditures.

The percentages of owners obtaining veterinary care during 1987 are shown in Table 3. Among dog-owning households, almost 78% had a dog examined and/or treated by a veterinarian. This is a slight but statistically significant increase over the corresponding percentage from the 1983 study. A more dramatic increase is evident with cat-owning households. The percentage of these households that obtained veterinary care increased from about 47% to just under 60%. This is a highly significant increase in households obtaining feline veterinary care, and it may reflect public and private efforts to stimulate interest in feline health care needs.

Table 3 also shows that a small percentage of pet bird owners obtained veterinary care in 1987, and this percentage was almost the same as in 1983. The percentage of horse owners who obtained veterinary care increased; however, over half did not obtain any veterinary care in 1987.

Owners were asked to indicate the services provided when they last had their pet or horse examined by a veterinarian. These results are shown in Table 4. The most common service was vaccination, mentioned by 65%. Another frequent service was physical examination (53%). Given the nature of these two services, it appears that a high percentage of owners obtained preventive health care services when they last visited their veterinarian.

Similar results were reported in the 1983 study, which showed high percentages of owners obtaining preventive care. Some services did increase significantly since the previous study. For example, in the 1983 report, only 2.8% mentioned "foods and diet aids," whereas 10.3% mentioned "foods and vitamins" in 1987. Additionally, dentistry services increased from 2.2 to 5.2%. Although dentistry and nutritional services are not provided as frequently as other services, their importance has increased over the past few years.

Table 4—Veterinary services provided when veterinarian last examined/treated animal

Service	% Owners
Vaccination	65.2
Physical examination	52.7
Drugs/medicine	42.5
Lab tests	19.6
Emergency care	17.4
Neuter/spay	16.1
Flea/tick products	16.1
Foods/vitamins	10.3
Grooming/boarding	8.4
Hospitalization	6.6
Other surgery	6.4
Dental care	5.2
Euthanasia	4.1
Others	1.2
Total*	271.8%

*Total indicates that average number of services provided was 2.7.

Factors influencing consumption of veterinary services

When asked if they had a regular veterinarian who they would normally contact if their pets or horses needed health care, 84% of owners indicated that they did. Dog, cat, and horse owners were similar in that the percentages who said they have a regular veterinarian exceeded 80%. For example, 83% of horse owners indicated that they have a regular veterinarian, although many of them did not obtain equine veterinary care in 1987. Therefore, a high percentage of companion animal owners believe that they have a veterinarian for their animals.

The key reason why companion animal owners selected their veterinarian was attributable to the location of the veterinary clinic. Nearly two thirds of owners identified convenient location as a factor in the selection process. In addition, 2 of every 5 owners mentioned the recommendation of a friend and/or reasonable fees as reasons for choosing their veterinarian. Another factor for a third of owners was convenient hours. Few owners identified yellow-pages listings, outdoor clinic signs, or other forms of advertising as factors in selecting their veterinarian. Only 5% of owners, for example, mentioned yellow-pages listing. This suggests yellow-pages advertising may not be effective for attracting new clients. However, outdoor clinic signs, yellow-pages advertising, and other forms of advertising may have helped some owners learn about a clinic's location or hours.

Companion animal owners were asked to rate their level of satisfaction with the veterinary care they received when their pet or horse was last examined by a veterinarian. Ratings were made on a 5-point scale, with "extremely satisfied" being 5, and "extremely dissatisfied" being 1. Satisfaction ratings were consistently high for all owners. In total, 55% indicated they were extremely satisfied with the veterinary care received, and 24% rated their satisfaction at 4, which was one point below extremely satisfied. Similarly high levels of satisfaction were observed among cat owners, horse owners, and others who did not obtain veterinary care during 1987. Conversely, 6% indicated they were extremely dissatisfied (rating 1), and another 5% expressed moderate dissatisfaction. Despite the fact that a few owners were not satisfied with their last veterinary visit, the overwhelming majority of owners were highly satisfied with veterinary care received.

A related question asked owners where else

they went for "professional health care services, advice, special diets, or medications." Over 60% did not identify another source for these services and products. Among those who did use another source, pet stores were mentioned most often, followed by feed/farm store and grooming shop. Two of 10 owners identified pet stores. As a separate group, pet bird owners were much more likely to identify a pet store as an alternative source; almost 50% of these owners went to a pet shop. Feed/farm stores were used by 1 of 10 owners. But, among horse owners, over 50% went to a feed/farm store, and another 20% went to a farrier.

These results show that many pet and horse owners will shop non-veterinary channels for animal health care services and products. Although the results are not clear on this point, owners may shop these non-veterinary channels primarily for animal health products (eg, flea/tick products, vitamins, wormers) rather than for professional advice.

Implications of findings

This research confirms important national trends in pet ownership preferences. Those trends are a decline in dog ownership and an increase in cat ownership. The Pet Food Institute has published data showing similar trends.[2]

If these trends continue, they will have important economic ramifications for small animal practice. Traditionally, cats have received less veterinary care than dogs. Even though cat owners' use of veterinary services increased in 1987, their total 1987 expenditures for feline veterinary care were about half of the canine expenditures. Therefore, these trends will need to be watched carefully in the coming years.

The research also shows that a higher percentage of cat owners obtained veterinary care in 1987 than in 1983. This increase probably is the result of efforts to stimulate interest in feline health care. Although the increase cannot be tied to a specific marketing or educational program, it illustrates the potential impact from marketing feline health care. Since cat ownership seems to be increasing, marketing feline health care will become even more important. Ideally, cat owners' use of veterinary services would increase to levels that dog owners now show.

Another compelling result is the high percentage of owners who say they have a regular veterinarian. Furthermore, a high percentage say they were satisfied with their veterinarian on the last visit. One implication of these results is that most companion animal owners have an attachment to a veterinarian. This means there are few unattached owners who are looking for a new veterinarian. Instead, most owners are likely to return to their regular veterinarian the next time they need veterinary care.

Another implication from these results is that a high percentage of owners apparently have obtained veterinary care at some point in the past. However, the last veterinary visit for many was prior to 1987. Horse owners serve as an example. About half of this group did not obtain veterinary care in 1987. At the same time, 8 of 10 horse owners have a regular veterinarian. Many probably had their horses examined in 1986 or 1985. Therefore, these horse owners as well as some dog and cat owners do not obtain veterinary care on an annual basis. Instead, they have more extended periods between veterinary visits.

Since many companion animal owners consume relatively less veterinary care, an ongoing challenge for the veterinary profession will be to encourage more frequent use of veterinary care. From a practitioner's point of view, this means converting "B" clients to "A" clients, and "C" clients to "B" clients. Additionally, it means changing owner perceptions about the need for and benefits of more regular veterinary care, especially for cats, horses, and pet birds. To illustrate, consider those who own a dog and a cat. Apparently, they believe that cats need less veterinary care than dogs. On average, these "dual" pet households had each cat examined 0.75 times in 1987, whereas the average for each dog was 1.33 times. This discrepancy points to the need for a continuing emphasis on feline veterinary care in marketing and public education efforts. Similarly, marketing and public education efforts targeted at horse owners (or pet bird owners) should focus on the benefits of more regular equine veterinary care. These efforts might lead to increased use of veterinary services among horse owners, as was observed with cat owners.

[1]Charles, Charles & Associates. The veterinary services market. Schaumburg, Ill: American Veterinary Medical Association, 1983.

[2]Pet Food Institute Fact Sheet, 1987. Washington, DC: Pet Food Institute, 1987.